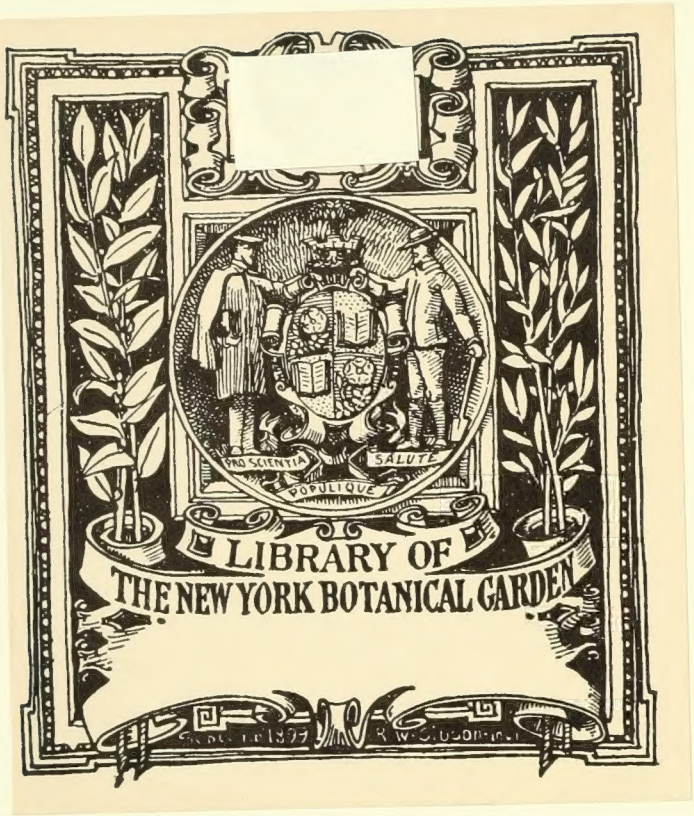

PRO SCIENTIA
SALUTE
POPULIQUE
LIBRARY OF
THE NEW YORK BOTANICAL GARDEN

THE GENUS CROCUS.

A MONOGRAPH OF

THE GENUS CROCUS

BY

GEORGE MAW, F.L.S., F.S.A., F.G.S.,

Member of the Royal Agricultural College;
Honorary Member of the Cotteswold Naturalists' Field Club;
Member of the Botanical Society of France;
Member of the Botanical Society of Edinburgh;
&c., &c., &c.

WITH AN APPENDIX

ON THE ETYMOLOGY OF THE WORDS CROCUS AND SAFFRON

BY C. C. LACAITA, M.A., M.P., F.L.S.

LIBRARY
NEW YORK
BOTANICAL
GARDEN

LONDON:
DULAU AND CO., SOHO SQUARE.
1886.

.C7
M38

TO

MR. AND MRS. C. G. DANFORD

I DEDICATE THIS VOLUME.

The journeys of Mr. and Mrs. Danford throughout the length and breadth of Asia Minor in the years 1876, 1878, and 1879, added much to the knowledge of the distribution of Crocuses in that district. Many of the Vignettes appearing in the present book have been engraved from original sketches made by Mr. Danford in the remote mountain region of the Taurus and other parts of Asia Minor, and to Mrs. Danford I am indebted for the roots of several new species of Crocus discovered by her, and also for much valuable information respecting the habitats of Crocuses throughout Asia Minor.

GEORGE MAW.

Benthall, Kenley, Surrey; June 30th., 1886.

NEW YORK
BOTANICAL

PREFACE.

THE preparation of this work has pleasantly occupied my spare hours from business during the last eight years.

Finding from the outset that it was impossible to successfully study the Crocuses from herbarium specimens without the concurrent help of the living plants, my first effort was to obtain for cultivation the various species that had not heretofore been introduced.

Besides a considerable number collected by Mr. Elwes and myself in the south of Europe, North Africa, the Mediterranean Islands, the Levant and Asia Minor, I have been largely indebted to the kindness of many friends as well as to residents abroad, to whom I am personally unknown, for the willing help they have rendered me in the collection of nearly all the known species, many of them till now undescribed, from remote districts. I have thus been enabled to grow in my garden at Benthall Hall, Shropshire, almost the entire genus, to watch the life-course of each species, and to make at my leisure the drawings of the plants, both in fruit and in flower, which have been here reproduced in the coloured plates.

I have also examined the collections of *Croci* in nearly all the continental and British Herbaria, and have had the advantage of more complete materials to work from than were procurable by those who have previously written on the genus.

Amongst those who have helped me I must express the special obligations I have been under to Mr. R. Barker, of Smyrna; the late Mr. G. Bentham; the late Colonel Burnaby; Mr. A. Biliotti, Her Majesty's Consul at Trebizond; Mr. W. Bourne, of Gijon, Spain; Mons. Boissier and Mons. Barbery, of Valleyres, Switzerland; Mr. J. G. Baker, of Kew; the late Professor Cesati, of Naples; Señor J. A. Carreras, of Port Mahon, Minorca; Mr. W. Carruthers, of the British Museum; Colonel R. Trevor Clarke, of Welton Place, Daventry; Mons. De Candolle, of Geneva; the late Rev. H. Harpur Crewe, of Drayton Beauchamp; Mr. and Mrs. C. G. Danford, of Ayres End, Harpenden, St. Albans; the Rev. Canon Ellacombe, of Bitton, Bristol; Mr. Henry J. Elwes, of Cirencester; Mr. Harry Fox, of Wellington,

Somerset; Mr. Owen Gibbons; the late Mr. Gavin Gatheral, Her Majesty's Vice-Consul, Angora; His Eminence Cardinal Haynald, Archbishop of Kalocsa, Hungary; the Rev. A. W. Hubbard, American Missionary of Sivas, Asia Minor; the Rev. J. W. C. Hughes, British Chaplain, Corfu; Mr. P. Henderson, Her Majesty's Consul, Aleppo; Dr. Théodore de Heldreich, of Athens; Sir J. D. Hooker; the late Mr. I. Anderson Henry, of Edinburgh; Mr. T. S. Jago, of Damascus; the Rev. G. C. Knapp, American Missionary of Bitlis, Asia Minor; Sir John Kirk, Consul General of Zanzibar; Dr. A. Kerner, Director of the Botanic Garden of Vienna; His Excellency Sir A. H. Layard; Mr. Julius Löytved, Danish Consul at Beyrout; Mr. C. C. Lacaita; Mr. J. F. A. Maling, Her Majesty's Vice-Consul at the Dardanelles; Mr. J. R. Millengen, of the Imperial Ottoman Bank, Constantinople; Mons. C. J. de Maximowicz, St. Petersburg; Major Murray, Ajaccio, Corsica; the Rev. W. Mackintosh, Damascus; Mr. Noel Temple Moore, Her Majesty's Consul at Jerusalem; Herr J. B. Misselbacher, Sen., of Schassburg, Siebenbürgen; Mr. W. Mc Pherson, of Seville; Miss M. C. Owen, of Gorey, Ireland; Dr. J. A. Pasquale, Naples; Mr. J. Quintana, Her Majesty's Vice-Consul, Syra; Dr. G. C. Raynolds, Medical Missionary, Van, Asia Minor; Dr. Edward de Regel, St. Petersburg; Dr. G. Radde, Tiflis; Mr. F. N. Reid, Minori, Ravello, South Italy; Señor Juan Rodriguez, Port Mahon, Minorca; Mr. H. N. Ridley, of the British Museum; Mons. Smernow, Tiflis; Mons. S. Sommier, Florence; Mr. John Saundars, Her Majesty's Vice-Consul at Cephalonia; Mr. T. B. Sandwith, Her Majesty's Consul at Canea, Crete; Lieutenant Karl Studniczka, Cattaro, Dalmatia; the Rev. Dr. T. C. Trowbridge, Aïn Tab, Syria; the late Chevallier de Tommasini, of Trieste; Mr. W. E. Thursfield, C.E., of Vienna; Dr. Warion, of the French Army Corps, Oran, Algeria; Mr. Horace P. White, Her Majesty's Consul at Tangier; the Rev. E. F. Wayne, Malta; Mr. Th. Waldmeier, of The Friend's Mission, Brumana, Aïn Salaam, Lebanon; Mr. T. Wood, Her Majesty's Consul at Patras; Dr. M. Willkomm, of Prague; and Mr. James Zohrab, Her Majesty's Vice-Consul at Erzeroum.

GEORGE MAW.

Benthall, Kenley, Surrey, June 30th., 1886.

A MONOGRAPH OF

THE GENUS CROCUS.

CHAPTER I.

LIFE-HISTORY AND PHYSIOLOGY.

IN commencing the life-history, it will be convenient to begin with the corm during the short period of rest, at about the latter end of July, intervening between the dying away of the vernal foliage and the commencement of the ensuing season's growth.

This period of rest may be counted by days rather than by weeks or months; for scarcely has the life-course of one season ended, than the new growth of the ensuing season commences; every living part of a crocus is annually reproduced, and in one sense there is no continuity of life within each organ. The corm tunic is the only permanent record of perennial existence, and even this in its living state lasts but a year.

Corm. The corm (Plate *A*, figs. 1-6), newly matured, is in form an irregular spheroid of from a quarter of an inch (0.0063 Mètre) to an inch and a half (0.038 Mètre,) in diameter, with depressions at its apex and base; these depressions are somewhat obscured by the corm tunic, which from being produced loosely above the corm summit, gives it the appearance of being higher in proportion to its width than is actually the case. The width of the corm, independently of the tunics, is always greater than its height; and in two or three species, *e. g. C. zonatus* (Plate IV) and *C. ochroleucus* (Plate XI), the width of the corm is nearly double its height, and it is discoid in form. In *C. gargaricus* (Plate XXXIX), the corm is almost spherical, and exceptionally small, rarely exceeding a quarter (0.0063 Mètre) or three-eighths

an inch (0.010 Mètre) in diameter. The largest corms in the wild state are those of *C. Salzmanni* (Plate IX), and the varieties of *C. sativus*, which often exceed an inch and a quarter (0.032 Mètre), or an inch and a half (0.038 Mètre) in diameter. Cultivated corms are invariably larger than those from wild sources.

The corm is occasionally somewhat eccentric, the flat base ranging obliquely instead of horizontally, with a larger development of the corm-mass on one side of the axis than the other. This is a constant feature in small seedling corms, (Plate C, figs. 11 *n*,) the mass of which in their earliest stages are developed on one side of the axis of growth; and in some species, especially in *C. versicolor*, this seminal obliquity of growth recurs again in the ordinary process of corm reproduction.

The corm consists of an almost homogeneous mass of cellular tissue and starch.

The corm of *Crocus vernus*, excluding the tunics, when at rest in November, was ascertained by Dr. Voelcker to consist of

Water	39.35
Oil	.56
Albuminous compounds*	3.19
Starch	48.44
Sugar	5.97
Cellular (woody) fibre	1.41
Mineral matter	1.08
	100.00

* Containing Nitrogen 0.51.

Such a composition would indicate that the corms are wholesome and nutritious. Those of two species, *C. Gaillardotii* and *C. cancellatus*, are largely used for food in Syria, and are retailed in the Damascus markets under the name of *Hŭrsinein* at twopence-halfpenny an imperial pint. The Damascus variety of *C. cancellatus* (*C. damascenus* of Herbert) was named *C. edulis* by Bossier and Blanche, from its use as food by the Arabs. The corms of *C. ancyrensis* are also eaten in Asia Minor.

The only structural feature of the corm that need be noticed is the central vascular column, running irregularly from the base to its apex; but this is functionless in the new corm, as it is merely the remnant of the connecting link between the previous year's foliage and corm, and takes no part in the new life-course.

The surface of the corm is covered with numerous little papillæ, which appear to be incipient or undeveloped buds; and it is the development of one or more of these as bud-growths, on which the next cycle of life depends. The position in which new growths are produced bears no relation to the old axis of growth; usually one only is developed, near the top of the corm, and it is generally by the side of, and not directly from, the vascular column of the old corm.

CROCUS SPECIOSUS

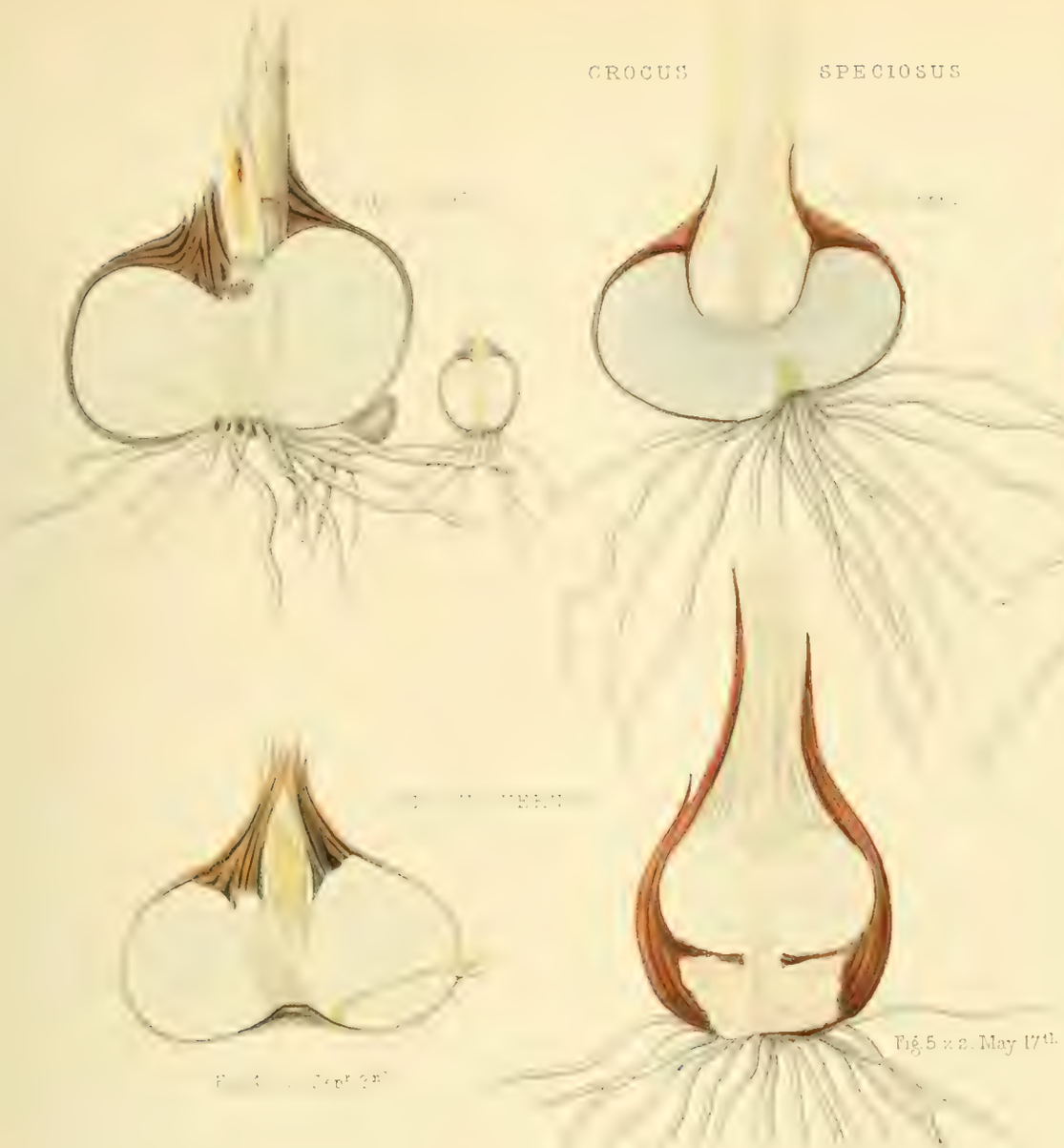


Fig. 5 × 2. May 17th.

CROCUS MINIMUS
Fig. 6 × 2. June 9th

CORM REPRODUCTION

Nudiflori. Vernal.

Nudiflori Vernal.

Involucrati Vernal

C. versicolor

Fig. 7. DISSECTION OF SPATHES.

Some species produce these bud-growths all over the corm; and in two, *C. nudiflorus* (Plate VI), and *C. lazicus* (Plate XII), this growth developing as stolons from various parts of the corm, independently of the old axis, is a constant feature. In two others, *C. speciosus* (Plate LXIV, and Plate A, figs. 1 and 3,) and *C. Fleischeri* (Plate LXVI), the buds are abundantly developed as bulbils, or cormlets, round the circumference of the old corm, and remain for the first year without producing foliage.

Concurrently with the commencement of the ascending growth is the production of roots from the bottom of the corm; but here again the old axis of growth is avoided; the roots are never produced directly from the old basal scar, but at some distance round its circumference, and occasionally from the top of the corm. I have been unable to trace any connection between them and the old vascular column.

The abundance of roots in different species bears no relation to the size of the corm, neither is the size of the corm related to the size or abundance of the flowers; but a large production of roots is directly related to the floriferous power of the species. The delicate roots are the most permanent organs in the cycle of life, and remain unimpaired till the old corm, to which they are attached, has been completely absorbed, and replaced by its successor. The new corm during its growth produces no true roots; but during the latter stages of its expansion, a single tuber-like ephemeral root is occasionally thrown out, and again re-absorbed at the maturity of the corm. This is represented in Plate A, fig. 6, and also on Plate XIX. fig. 3.

Although of only occasional occurrence in the reproduction of the fully-matured corm, the ephemeral root is a constant feature in the later stage of the process of germination; and its production accompanied by a single true root-fibre (Plate C, figs. 7, 8, 9, and 10,) is concurrent with the first stage of the growth of the corm. Its occasional appearance in the growth of the matured corm, would seem to be a character inherited from the process of germination; on the other hand, the true root-fibre, which is always produced from the base of the seminal corm (Plate C, *l*,), never appears in the after-stages of corm reproduction, till the growth of the plant in the following season.

The successive stages of the process of annual replacement is exhibited in Plate A, figs. 1-6. The new growth is as it were planted into the substance of the old corm, in a position having no relation to the axis of its own growth: the new corm expands, absorbs the entire substance of the parent, throwing off a new set of tunics from its surface, which is added internally to the successive tunic layers of former generations.

Tunics. The tunics are homologous with the foliage; and the upper tunics are merely the expanded bases of the proper-leaves and sheathing-leaves, with a

structure adapted to the protection of the new corm as it annually expands.

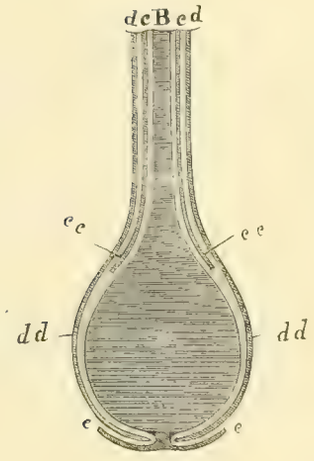


Fig. 1.

Fig. 1.—represents in a diagrammatic form a section of a corm and its surrounding tunics: A, the body of the corm; B, the scape and ascending axis; *c*, *c*, the cap produced upwards into the proper-leaves c, represented separately in Fig. 2; *d*, *d*, the main tunic produced upwards into sheathing-leaves *d*, represented separately in Fig. 3; *e*, *e*, the basal tunic.

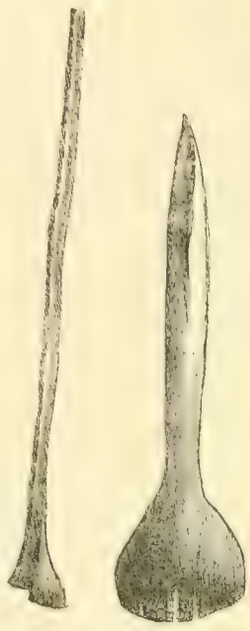


Fig. 2. Fig. 3.

In the early stages of the new growth, the foliage completely environs the incipient corm, and is articulated to its base within the mass of the old corm. As the new corm becomes free from the parent mass and expands, the main tunic, forming the base of the foliage, disarticulates from the base of the corm in successive layers, and slips upwards; this would leave the bottom of the corm exposed, but for the existence of an organ I have termed the Basal Tunic; this is also homologous with the foliage. Whilst in the upper tunics each is separate, and independently connected with a leaf or sheathing-leaf, the basal tunic would represent a number of growth points united together at the base, and adhering to the base of the corm, its short wiry rays clasping the base of the main tunic: like our own upper and nether garments, the main and the basal tunics collectively maintain the continuity of the clothing. Both the main tunic and the basal tunic present a great variety of structure and adaptations.

The vascular structure of the leaf is reproduced in the tunics. In these we find a series of about a dozen strong vertical fibres, with somewhat fine intervening parallel, confluent or reticulated fibre. A piece of netting hung vertically would roughly represent a leaf-skeleton, and when drawn out laterally, a reticulated corm-tunic. This is analogous to what takes place in the development of the tunic: the expanding corm spreading out the vascular structure, which appears in a more condensed form in the leaf, of which the corm-tunic forms the base.

A wonderful diversity of pattern and structure occurs in the tunics of the several species of the genus, often exhibiting characters so well marked that a mere fragment is sufficient for the determination of a species; and all are constructed on a plan related to the annual replacement and expansion of the corm.

The tunics of the great majority of species consist of a fibrous skeleton on a membranous base; presenting great variety of pattern, and every gradation between parallel unbranched fibres, and reticulated fibres.

In some species the tunics are composed almost exclusively of thin membrane; and in others, again, the tunics as in *C. lævigatus*, (Fig. 5, *F,*) and in the annulate species are strongly coriaceous throughout, without any distinct fibrous structure.

The coriaceous and membranous tunics occasionally present a fibroid structure without having true fibres; and, as in the case of *C. aureus*, (Plate LV. fig. 12, *e,*) and its allies the coriaceous membrane is more or less split up into flat fibre-like parallel divisions. The most remarkable tunic structure is present in two eastern species, *C. Fleischeri*, (Plate LXVI, and Fig. 4, *F,*) and *C. parviflorus*, (Plate LXVII,) in which the fibres are distinctly platted into parallel vertical strands, a structure which also occurs in some eastern species of Xiphium.

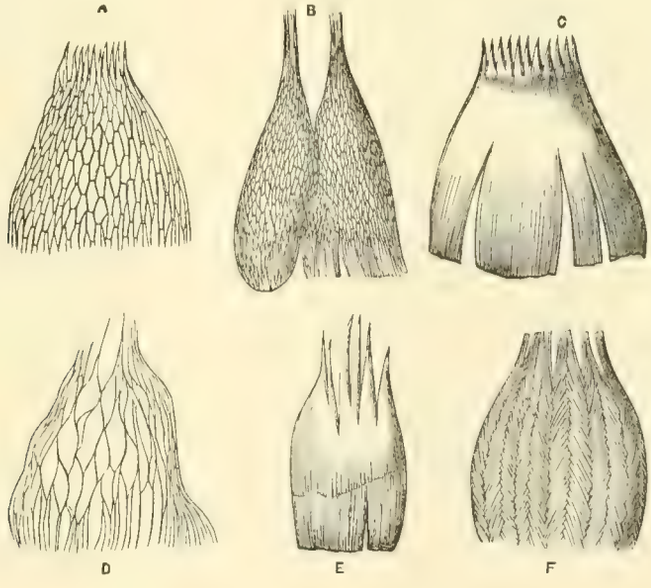


Fig. 4.

Fig. 4. A, The main tunic of *C. Sieberi;* B, of *C. sativus,* var. *Pallasii;* C. of *C. serotinus;* D, of *C. carpetanus;* E, of *C. versicolor;* F, of *C. Fleischeri.*

The basal tunic also presents a great variety of structure. It generally consists of star-like bodies composed of fibrous rays spreading from a central disc (Fig. 5, *b,*); and in all the species with coriaceous tunics, excepting *C. lævigatus*, the basal tunic

consists of a series of imbricated annuli surrounded by short teeth (Fig. 5. *D. E.*) which seem to be homologous with the wiry rays of the reticulated species. The annuli of the annulate Croci represent the most condensed form of the whorl of growth: a mere coriaceous ring, in which the superimposed row of little points represent the separate points of growth analogous to the leaves developed from the summit of the corm.

Figs. 4 and 5, represent some of the more general types of structure of the tunic.

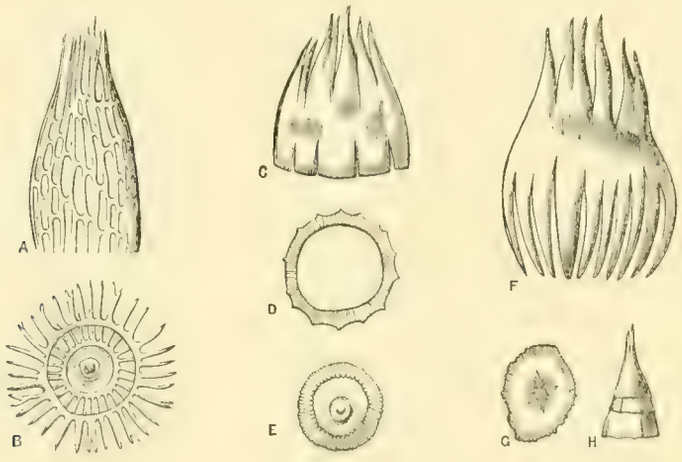


Fig. 5.

Fig. 5. A, The main tunic of *C. cancellatus;* B, basal tunic. C, main tunic of *C. Danfordiæ;* D and E, basal tunics; F, G, H, the main tunic, basal tunic, and cap of *C. lævigatus.*

All these diverse structures, both of the main tunics and of the basal tunics, which vary as regards pattern, are distinctly related to one common purpose, viz: the protection of the corm during its annual reproduction and expansion within the tunics.

The thin, membranous tunics rupture during the expansion of the corm; and the superimposed layers of shaving-like shreds maintain the continuity of the covering. The function of the reticulated structure is also obvious, allowing lateral expansion; and the stranded tunic of *Crocus Fleischeri* also permits of lateral expansion. But this widening out laterally involves the drawing up of the tunic from the base of the corm, and but for the presence of the separate basal tunic, the bottom of the corm would be left bare. The claw-like rays of the usual pattern bend strongly upwards and inwards, and clasp the base of the main tunic as it slips upwards. The basal annuli of the annulate species, with rows of little teeth on their upper margin, slip over each other, and cling by the teeth to each other, and to the bottom of the main tunic.

In *C. lævigatus*, where the annuli of the basal tunic are absent, the protection of the bottom of the corm is effected by an adaptation of the structure of the main tunic, which is split up into a series of vandyke divisions; these strongly bend inwards in a downward direction, and clasp the bottom of the corm. The successive annual tunic-layers are very persistent; and in the wild state, as many as fifteen or twenty super-imposed tunics may be counted, representing as many years growth and complete reproduction of the entire plant.

Foliar Organs. Of the two distinct sets of leaves, the *sheathing-leaves*, enviroming the base of the plant, are much shorter and broader than the proper-leaves; they vary from three to six in number, and closely invest the ascending axis. The inner sheathing-leaves are invariably longer than the outer; and thus as regards length graduate inwards towards the proper-leaves, into which they also graduate in structure, the lowest and outermost being a mere membranous tube, the longest and innermost generally foliaceous, spathulate at its extremity, and only tubular below.

The sheathing-leaves generally fall short of, but occasionally exceed the proper spathes; their relative lengths are sufficiently constant for use in specific determination.

The sheathing-leaves, excepting only in one species, exceed the basal spathe. In *Crocus lazicus* they are almost abortive, leaving the basal spathe exposed.

The next organs, approached in an inward and upward direction, are the *proper-leaves*, familiarly known as the Grass of the Crocus, in which there is a great variety of structure and of size. The leaves of *Crocus vernus*, a section of which, on an enlarged scale, is represented in Fig. 6, *A*, are of the type most commonly found in the genus; in which the blade is about an eighth of an inch (0.0032 Mètre) wide, and the keel about one third the width of the blade. The blade is always somewhat revolute, approaching the margins of the keel, and forming with the sides of the keel the lateral channels at the back of the blade. The lateral

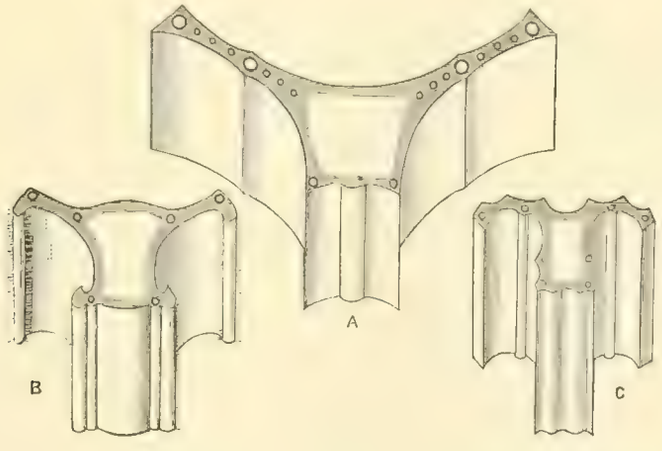


Fig. 6. Leaf sections. A, *vernus*, B, *sativus*. C, *nudiflorus*.

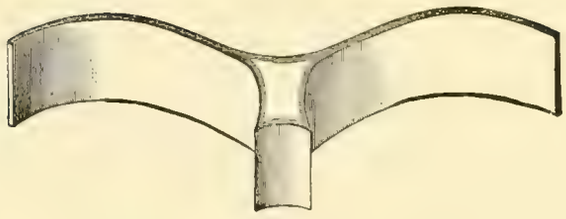


Fig. 7. Leaf section of *C. iridiflorus*

channels vary much in different species, from being entirely open, as in the case of *C. iridiflorus* (Plate I, fig. 9, and fig. 7), to being closed by the margin of the blade meeting, or nearly meeting the margin of the keel. In the majority of species the lateral channels have a plain surface, and in others, *e.g. C. nudiflorus* (Plate VI, fig. 8, and fig. 6, *C*,), they contain one, two, or more ridges, the presence or absence of which is a character sufficiently constant for specific distinction.

The proper-leaves are generally glabrous; but in some species, as in *C. sativus* and its allies (Fig. 6, *B*, and Plate XXIX, fig. 8,) and in *C. aureus* (Plate LV, fig. 9), the margins of the keel and blade are ciliated; this is also a constant character.

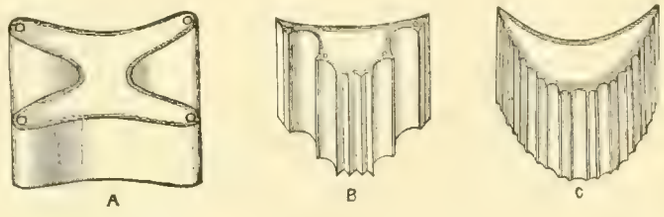


Fig. 8. Leaf sections. A, *vallicola*. B, *nevadensis*. C. *carpetanus*.

Of the several departures of leaf-structure from the ordinary type, the Central Spanish species, *C. carpetanus* (Plate XLI, fig. 8, and fig. 8, *C*,), is the most aberrant; the distinction between the keel and the blade is lost; the leaf is semi-cylindrical, the back being furrowed with about sixteen alternating ridges and channels. The leaves of the South Spanish *C. nevadensis* (Plate XLII, fig. 15, and fig. 8, *B*,) present a character intermediate between those of *C. carpetanus* and those of the more general type, the back being ridged and furrowed, but containing also slight lateral channels.

In three Eastern species, *C. vallicola* (Plate II, fig. 17, and fig. 8, *A*,), *C. Scharojani* (Plate III, fig. 7), and *C. zonatus* (Plate IV, fig. 9), the leaves depart from the general type in the opposite direction, the keel being developed to nearly the width of the blade, and the white central band but slightly developed.

The leaves in the great majority of species appear with the flowers, but in eleven autumn-flowering species, viz: *C. iridiflorus*, *C. vallicola*, *C. Scharojani*, *C. zonatus*, *C. karduchorum*, *C. nudiflorus*, *C. granatensis*, *C. medius*, *C. cancellatus*, *C. speciosus*, and *C. pulchellus*, the leaves are in a dormant condition, barely half an inch (0.013 Mètre) long at the flowering time, and remain hidden within the sheathing-leaves till the ensuing spring. In all the other species the leaves appear at the flowering time: in some they are well developed before the flowers appear, and in other species they are only just visible beyond the sheathing-leaves.

The leaves of every species continue to grow after the flowering time up to the maturity of the new corm, when they attain a length of from eight or nine inches (0.225 Mètre) to two feet (0.600 Mètre), and in width they vary from one twentieth of an inch (0.0012 Mètre) to half an inch (0.013 Mètre).

The leaves of nearly all the species die away in June or July; but in two, *C. Scharojani* (Plate III) and *C. karduchorum* (Plate V), they last on till the ensuing flowering time in the autumn: the leaves of two years' growth existing contemporaneously, though the younger set is hidden within the sheathing-leaves.

The number of the leaves in different species varies considerably. In *C. medius* (Plate XXVII, fig. 2,) rarely more than two, or at most three or four are produced; in several species there are as many as ten or twelve to a corm; species with broad leaves have fewer than those in which the leaves are narrow.

Scape. The ascending axis from the corm summit to the base of the ovary is either triquetrous, or tetraquetrous; varying from a quarter of an inch (0.013 Mètre) to an inch (0.025 Mètre) or two inches (0.050 Mètre) at the flowering time, lengthening out rapidly as the capsule matures, so as to bring it above the ground from five to six inches (0.150 Mètre) from the summit of the corm. As a rule the scapes of those species which are shortest at the time of flowering attain the greatest height at the maturity of the capsule.

In some species, *e.g. C. nudiflorus* (Plate VI), but one scape and flower is produced within each set of sheathing-leaves; but generally there are two or more scapes. The scape is never branching, and never carries more than one flower.

Spathes. The Spathe (Plate A, fig. 7), or foliaceous appendages to the ascending axis, form two distinct series; those springing from the base of the scape, and those springing from the base of the ovary. The former, termed the basal spathe by Baker, is not always present; and the presence or absence of a basal spathe determined Herbert, in his classification of the genus, to divide it into *Involucrati*, and *Nudiflori*. Of the *Nudiflori* the great majority are vernal species; and most of the *Involucrati* are autumnal. The basal spathe is a membranous tube, springing from the base of, and enclosing the scape, and reaching just above the ovary. A basal spathe sometimes encloses several scapes; but occasionally there is a separate

basal spathe to each scape. The proper spathe, springing from the base of the ovary, consists of one or two membranous, or slightly foliaceous organs of the nature of bracts, one of which is tubular; the inner spathe when present is generally ligulate. When one spathe only is present, it is invariably tubular to within a short distance of its summit. The presence of one or of two proper spathes is an almost constant character, and valuable in the determination of species. The absence or presence of a basal spathe seems to be directly correlated with a double or a single proper spathe respectively: of the thirty-eight species of the *Nudiflori*, all have a double proper spathe with the exception of two species, *C. gargaricus* and *C. cyprius;* and of the thirty-one species of the *Involucrati*, twenty-five have a single proper spathe, and six only, *zonatus*, *Cambessedesii*, *Malyi*, *minimus*, *sativus*, and *hadriaticus* have a double proper spathe.

The proper spathes, excepting in one or two species, always exceed the sheathing-leaves, and environ the tube to within an inch (0.025 Mètre) or an inch and a half (0.038 Mètre) of the throat.

Perianth. The Tube is invariably cylindrical, varying in the different species from two and a half (0.063 Mètre) to six inches (0.150 Mètre) in length, and generally partaking in its upper exposed portion of the colouring of the flower, the markings of which are produced down the tube. The awn-like process from the summit of the capsule is merely the remnant of the base of the tube, intertwined with the dead remnant of the proper spathe.

The throat is of special interest in relation to specific character, as the presence or absence of the beard, a small bunch of transparent hairs at the base of the filament, is a good distinctive specific character, so invariably constant that Haworth, in 1809, used it for grouping the genus in two sections which he termed *Piligeri* and *Depilati.*

The throat internally is almost invariably more or less orange; there are few species in which the orange or yellow stain is not to some degree present. In albinos, where the general flower-colouring is blotted out, the orange colour of the throat is still retained; and in the albinos of one or two species that are uniformly orange, the orange of the throat is constant.

In those species with orange filaments, the orange colour of the throat is more marked than in species with white filaments. The orange colour cells of the throat appear to be on the inner surface only; though the orange colour is generally to some extent visible externally. The orange of the throat is nicely limited to where the fallen pollen grains accumulate; and as these have a strong power of staining, the golden zone of the throat may be a character inherited from the tincture of the fallen grains; analogous to the bleaching and zonal colouring of the hair and feathers round the orifices of the bodies of many animals, which suggest to the eye

a relation to the functions of which they are the channels.

The Perianth segments vary from half an inch (0.013 Mètre) in *C. parviflorus* (Plate LXVII) to two and a half inches (0.063 Mètre) in length, as in *C. speciosus* (Plate LXIV); and from an eighth of an inch (0.0032 Mètre) to three-quarters of an inch (0.019 Mètre) in width. Most commonly obovato-lanceolate in form, but varying much in outline; occasionally emarginate at the summit, but more frequently produced into a point. The form, and also the relative length and width are not constant, and cannot, with one or two exceptions, be relied on as specific characters; and an emarginate and finely pointed segment may occur in the same flower. In *C. vallicola*, (Plate II, figs. 1 and 13) however, the curious acuminate segment is a well marked and constant feature. The three inner segments are always somewhat shorter than those of the outer whorl: in *C. iridiflorus* (Plate I,) the difference is so much more striking than in any other species that it suggested to Schur its generic separation as *Crociris*.

There appear to be two distinct sets of colour cells in the segments, the disposition of colour on the inner surface never exactly corresponding with that of the outer. By a little dextrous manipulation the cells of the segments can be peeled off as three distinct layers, the inner or middle layer being almost colourless. Excepting in the self-coloured species, the colouring of the outer surface of the outer segments is notably different to that of the inner surface, as well as to both surfaces of the inner segments. In the species and varieties with distinctly striped and feathered markings, the feathering is confined to the outer surface of the outer segments, excepting in *C. versicolor* (Plate XVI), in which the feathered markings are nearly uniform on all six segments. In all other species the inner whorl is either differently feathered, or unfeathered with just an indication at the base of a few lines of incipient feathering.

Although the feathered markings are usually confined to the outer surface of the outer segments, this is not invariable, and in three or four species, namely, *C. zonatus* (Plate IV), *C. vallicola* (Plate II), and *C. pulchellus* (Plate LXV), the purple markings are on the inner surface. *C. pulchellus* also has separate markings externally.

In the feathered blue and white species the featherings are purple; in the orange species, of a rich bronze-colour. But in each case the colour-cells of the markings are purple; the bronze colour of the feathering of the orange species being due to the overlay of purple on the orange ground; and in the pale forms and albinos of the orange species, the markings are developed as purple instead of bronze.

Feathered markings are not constant as a specific character, as the majority of species vary with self-coloured and feathered flowers. Indeed, colour itself is of

the least importance for specific diagnosis; nearly all the Cyanic species vary in colour to white, and the Xanthic species occasionally vary to white, and even to blue; but this is very exceptional.

The Xanthic species are more constant in their colouring than the Cyanic; and I know of no instance in which a blue species varies with orange flowers; though Herbert placed the orange *C. susianus* as a variety of the lilac *C. reticulatus;* and *C. chrysanthus* and *C. biflorus* as varieties of one species; a view which cannot now be accepted.

There are several special features in colour-variation which must be noticed. Three or four species, as *C. asturicus*, *C. versicolor*, *C. vernus*, and *C. aërius*, are essentially various in their colouring; and in these it is difficult to find two flowers precisely alike in their colour and markings even in the same habitat: other species are perfectly constant; and again there are those which are uniform in their colouring; in the same habitat which vary geographically, *e.g. C. cancellatus* (Plate XXXI, fig. 1,) at its western limit, in the Ionian Islands, has white flowers, eastward, in Greece, they are lilac, and still further to the east, in Asia Minor and Syria, the colour deepens, and the flowers are invariably of a rich purple (Plate XXXI^b, fig. 2). This tendency to change eastward from white to blue does not stand alone; and is also noticeable in *C. biflorus* (Plate LIX). The Italian form is generally white, varying occasionally to lilac; but in Georgia, in the variety of the species known as *C. Adami* (Plate LIX^b, fig. 2), the flower is almost invariably lilac or purple. There are also many instances of mimetic variation: two distinct species assuming the same form of special marking or colouring, when associated in the same habitat. I shall further refer to this subject in dealing with the geographical distribution of the genus, and the special characters of species in relation to geographical association.

Filament. The Filament (Pl. B) is generally white or yellow, and often partakes of the colour of the throat; in several deep purple species it is purple or lilac. In colour it is not related to the colour of the anther, and in the five or six white-anthered species it is distinctly orange. In *C. cyprius* (Plate LVII, fig. 2) it is bright scarlet.

The filament is generally of about half the length of the anther, and their relative length is constant within each species. In *C. Boissieri* (Plate XX, fig. 4), from Cilicia, the filament is notably longer than the anther, and there are two or three species in which it is scarcely one fourth the length of the anther.

In most species the filament is slightly papillose; and in *C. pulchellus* and *C. Tournefortii*, it is densely covered with hairs; but the hairy appendages of the filament have no relation to the presence of the beard in the throat.

Anthers (Plate B, fig. 1). There are few specific characters in the anthers that need be referred to, except that in seven or eight species the anthers are white, and in nearly all the remaining species orange. The colour of the anthers, unlike

the variable colour of the stigmata, is constant; the only exception being the occurrence occasionally of dark chocolate tissue near the base. In *C. hyemalis* var. *Foxii* (Plate XLIII, fig. 9), the tissue of the entire anther is chocolate instead of orange; and in *C. Crewei* (Plate LX, fig. 6) this is a constant specific character. The pollen grains of *C. Crewei* and *C. Foxii* are orange; in all the white anthered species, the pollen grains are also white. The anthers vary considerably in their size, and in their length relative to that of the filament in different species; but within each species the size is very constant. The only marked departure in form, from the usual oblong, slightly spreading anther, occurs in *C. aureus* (Plate LV, fig. 6-7), in which the anthers are suddenly divergent, and taper from the base to the summit.

The pollen grains (Plate B, fig. 2) vary much in size. In nearly the whole of the species they are regular spheres, of from one four hundredth to one two hundredth of an inch in diameter; in the majority of species they are about one three hundredth of an inch (0.0008 Mètre) in diameter. Within each species the size of the grains is remarkably constant, excepting only in *C. sativus*, and the allied species, in which the grains are variable in size, and also of irregular outline. In the sterile garden forms of *C. aureus* (Plate LV *b*, fig. 1. *c*.) the effete pollen grains are much reduced and variable in size, and are of irregular outline. In about half the species the grains are papillose, and in the remainder, glabrous. In the grains of *C. aureus* and its allied species, Mohl was the first to notice the presence of a sinuous, or spiral superficial marking; it is also present in *C. carpetanus*, and one or two other species. Mr. Carruthers, from whose drawing Plate B, fig. 2, is copied, has ascertained that these markings are slight channel-like depressions, due to the partial thinning of the outer membrane or sack. The pollen grains become very

Fig. 9.

quickly distorted in form on their application to the stigma, and previous to the emission of the pollen tube become fusiform. Professor Martin Duncan has pointed out to me the pollen tubes (Fig. 9) have cross dissepiments at irregular intervals, and that molecular movement and cyclosis are to be seen in the tubes amongst the granular contents.

Stigma. The Stigmata present a great variety of type, and are so diverse in their character that I am unable to adopt the three-fold classification, based on the

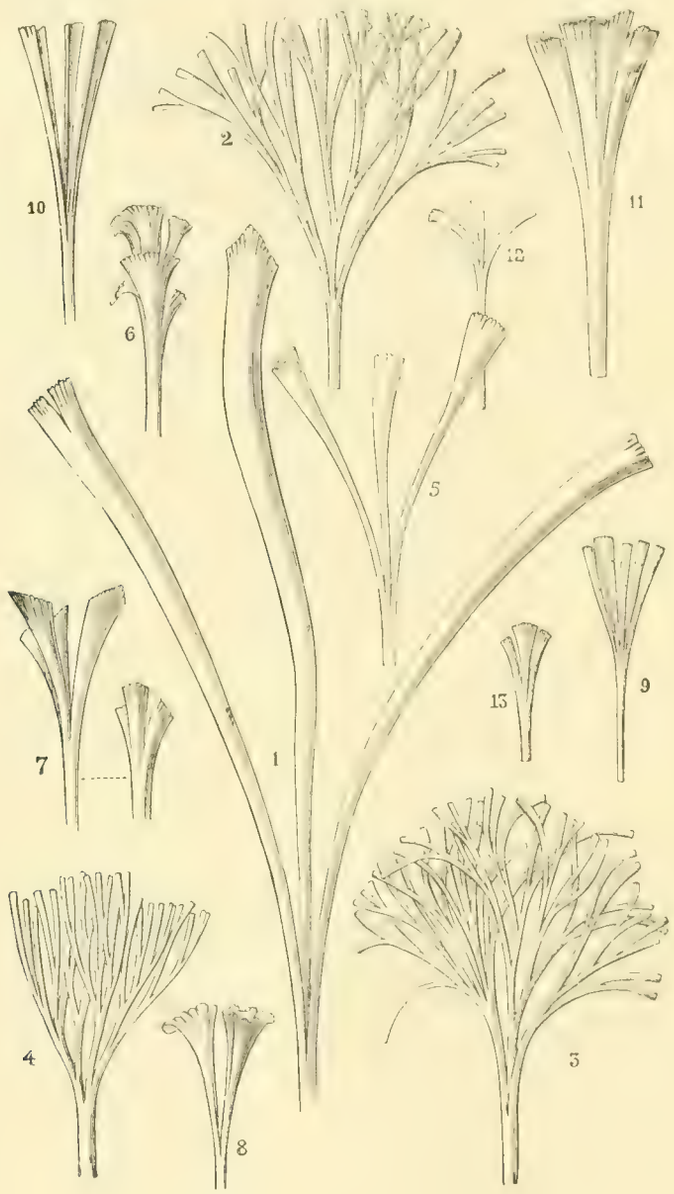


Fig. 10.—Stigmata of Croci, enlarged four times.

1. *C. sativus.* 2. *C. iridiflorus.* 3. *C. medius.* 4. *C. lævigatus.* 5. *C. montenegrinus.* 6. *C. nevadensis.* 7. *C. aureus.* 8. *C. carpetanus.* 9. *C. Olivieri.* 10. *C. biflorus.* 11. *C. vernus.* 12. *C. caspius.* 13 *C. parviflorus.*

structure of the stigmata, proposed by Mr. Baker. Fig. 10 represents a few of the more extreme types, between which there are many gradations. In *C. sativus*

and its allies, the stigmata are bright scarlet, and entire. In the great majority of species they are orange, more or less divided. In *C. vitellinus* and its allies, they are developed as a bunch of capillary divisons; in *C. aureus*, as a condensed mass of sessile stigmata, forming the termination of the style. In one or two species, as *C. carpetanus*, and *C. nevadensis*, the stigmata are almost colourless, tending to pale lavender. The most remarkable departure from the general type is in *C. iridiflorus*, in which the colour of the stigmata is rich purple.

The colour of the stigmata is not so constant within each species as the colour of the anthers. In *C. vernus*, and several other species which have normally orange stigmata, they vary to cream-colour; and in *C. aureus*, the stigmata of which are usually pale buff, occasionally vary to a rich orange-colour. The stigmata of *C. chrysanthus* are very variable both in size and colour, ranging from pale buff to bright orange-scarlet. Within each species the height of the stigmata is tolerably constant, but it differs much in different species, either exceeding, equalling or falling short of the anthers; the style is invariably glabrous, and never papillose or hairy like the filament.

Whilst the character of the stigma is of little use for natural grouping, it is invaluable for the determination of species; and in quite half of the species, the stigmata are so special in their character that they may be relied on alone for specific distinction.

The Ovary and Capsule. Plate B, fig. 5, *a*, *b*, *c*, *d*, *e*, represents the successive stages of growth of the ovary, and of the capsule to its maturity and dehiscence, the changes in which must be studied and compared to enable the structure to be properly understood.

The ovary is trilocular; and in its earliest stage before the maturity of the flower the dissepiments, (Plate B, fig. 5, *a*,) are represented only by the slightly inflected united margins of the contiguous carpels *a*. Later on, at the time of flowering, *b*, the dissepiments are still further developed, reaching and just coming in contact, without being united, at the centre of the ovary. The placentas are placed on the inner margins of the dissepiments, each of which bears two rows of sessile ovules. A further stage, *c*, is the actual union of the dissepiments at the central axis, which takes place just after the flowering time, resulting in a three-celled ovary, each of the cells being formed of a single carpel. Theoretically, each dissepiment consists of the infolded margins of two adjacent carpellary leaves, represented diagrammatically in fig. 5 *d;* though in no stage is there any partition visible in the dissepiments, and the dehiscence is loculicidal along the dorsal suture.

The homology of the ovary becomes apparent on the dehiscence of the capsule, *e*, when the seed is matured: the central column, which was only for a short time existent, through the temporary adhesion of the ends of the dissepiments, is again

dissolved, concurrently with the dehiscence at the dorsal sutures, the lines corresponding with the midribs of the leaves; the valves and central dissepiment (each valve representing two half carpels) being suddenly bent back, as in Plate B, fig. 4.

In the development from the ovary to the capsule, we have first the union of the margins of the carpellary leaves, and then a separation along their central or dorsal suture; resulting in each valve of the capsule being formed of the halves of two adjacent carpels.

The ovary of the autumnal species remains underground, protected by the spathes and sheathing leaves, till the latter part of April, when the scape rapidly elongates with the growing capsule, bringing it to the surface. The capsule of the vernal species comes to the surface immediately after flowering, at the same time as that of the autumnal. In some species the capsule never rises above the ground surface, but in others the scape is produced to a height of several inches. The capsule presents few distinctive specific characters, and varies very much both in size and proportions within each species. In the majority of species it is oblong, about twice the height of its width. In *Crocus gargaricus*, (Plate XXXIX, fig. 2,) it is exceptionally short, scarcely higher than its width.

Seed. Just at the time of maturity, on the dehiscence of the capsule, the seeds present many well-marked specific characters; but these are for the most part lost as the raphe, chalaza, and caruncle wither, and the dead ripe seed parts with its distinctive colouring. The raphe, chalaza, and caruncle are in many cases, *e.g.*, in *C. nevadensis* and *C. corsicus*, distinctly lighter in colour than the general body of the seed; but more generally the seed and its superficial appendages are of a uniform colour throughout. The two most general forms are a buff, glabrous seed, and a papillose, red seed. In *C. vitellinus* and the allied species, the seed is oblong in form, and bright crimson in colour, with a glabrous, shining surface. In *C. sativus* and its allies the seed is nearly spherical, and of a madder-brown colour. In *C. aureus* the seed is crimson, and covered with minute hairs. In *C. gargaricus* the nearly spherical seed is bright orange. Buff seeds finally ripen to fawn-colour; and the red seeds pass through several changes of colour, commencing with bright rose, changing to red, and lastly, at maturity, to rich reddish chocolate. (Plate XXV, fig. 11, *f*, *g*.)

Germination. A description of the life-history of a crocus would be incomplete without some reference to the process of germination in its various stages; this is represented in Plate C.

The ripening of the seed, and dehiscence of the capsule takes place in June or July. The seed lies dormant for several months, and germination takes place at about the flowering time. The autumn-flowering species germinate from September to November; the vernal species not till the early spring months. A large pro-

Fig 1, STAMENS, MAGNIFIED FOUR-FOLD

Fig. 2, POLLEN GRAINS, MAGNIFIED 200-FOLD

Fig. 3, SECTIONS OF OVARY AND CAPSULE.

GERMINATION OF CROCUS AUREUS.

J. Maw del.

J. Hoyle Lithº E. 26

portion of the seeds, however, fail to vegetate the first season, and remain in the ground dormant for another year.

Some experiments I made on this point, between the years 1878 and 1884, gave the following results.—Of forty seeds of each of the undermentioned species, ripened in June, 1878, and sown in August, 1879,

C. Imperati,	25	vegetated	in	1880,	and	9	in 1881.
C. etruscus,	2	"	"	"		31	"
C. vernus,	2	"	"	"		22	"
C. asturicus,	4	"	"	"		2	"
C. aureus,	3	"	"	"		1	"
C. versicolor,	0	"	"	"		13	"

and a few more of some of the species vegetated in the third year, 1882; so that barely half as many vegetated the first year as those that remained another year dormant and then vegetated. The seeds in this experiment were a year old when sown; fresh seeds would probably have vegetated in larger proportions.

Fig. 1. Plate C, represents a section of the dormant seed of *C. aureus*, magnified sixfold; *a*, the carunculate extremity; *b*, the base, or chalazal extremity; *c*, the albumen, or endosperm; *d*, the embryo.

Fig. 2, the first stage of germination; *b**, the base of the cotyledon protruding from the base of the seed; *c*, the endosperm; *d*, the enlarged apex of the cotyledon absorbing the endosperm.

Figs. 3 and 4, magnified three-fold, represent a further stage in germination; *c*, the endosperm; *d*, the enlarged apex of the cotyledon; *e*, the base of cotyledon; further produced than in fig. 2, with the primary root, *f*, protruding. Fig. 5, a further stage; *g*, the cotyledon; *h*, the base of the cotyledon including the plumule.

Fig. 6, a further stage; *g*, the cotyledon; *k*, base of the cotyledon; *j*, the sheath of the first leaf, which is protruding at *i*; *l*, the primary root.

Figs. 7, 8, 9, and 10, further stages; *g*, the cotyledon; *i*, the first leaf of the plumule; *j*, the sheath of the first leaf; *k*, base of the cotyledon; *l*, primary root; *m*, an enlarged ephemeral root, reabsorbed on the maturity of the corm; this occasionally appears in the reproduction of the matured corm (See Plate A, fig. 6), it is thrown out at the base of the growing new corm before its maturity, and reabsorbed; in corm-reproduction it is only occasional, and seems to be an inherited recurrence of a constant feature of the later stages of germination. *n*, the young corm.

Fig. 11, *n*, the perfected young corm of the first season, magnified three-fold, bearing a single leaf. The young corm during the two succeeding years is annually replaced by an enlarged corm, after the manner of the annual replacement

of the matured corm exhibited on Plate A. The seedling corm becomes fully matured, and reaches the flowering-state at the end of the second or third year after germination.

The seed, under natural conditions, germinates near the surface of the ground; but the fully matured corm is rarely found at a less depth than three inches (0.075 Mètre), and often occurs four or five (0.125 Mètre) inches deep. The small one-year-old corm is always found near the surface, and it is evident that in the annual process of reproduction, it possesses some power of descending deeper into the ground. This would, however, seem inconsistent with the mode of reproduction, in which the new corm is found on the summit of that which it replaces; but that such a power is possessed was strikingly illustrated in the above named experiments on germination. The seeds were sown half an inch (0.013 Mètre)

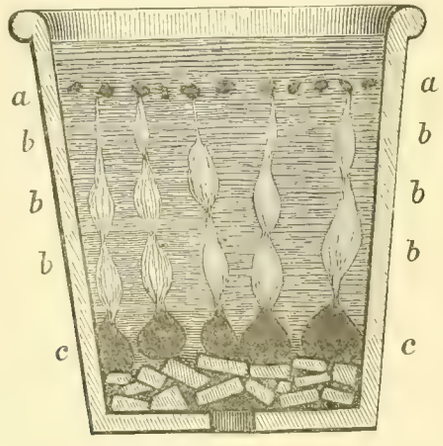


Fig. 11.

deep (*a*, *a*) in flower-pots five inches (0.125 Mètre) deep in August, 1879, and were left undisturbed till September, 1884; they were then turned out, and the corms were found to be arranged in the manner represented in Fig. 11. They were nearly all at the bottoms of the pots (*c*, *c*,) closely pressed against the drainage materials, and over each corm was a string (*b*, *b*, *b*,) of empty corm-tunics, occurring at intervals of about three-quarters of an inch (0.019 Mètre), and representing the annual downward progress of the corm.

The process of the descent of the corm from near the surface to the necessary depth is difficult of explanation, and it must be viewed as one of many self-protective phenomena in plant-life, the *modus operandi* of which we do not understand.

Contemporaneously with the maturity of the seed, the foliage attached to the new corm, and the roots attached to the remnant of the previous year's old corm,

Fig. 1, actual size
Crocus sativus

Fig. 3 × 2.
C. Cartwrightianus.

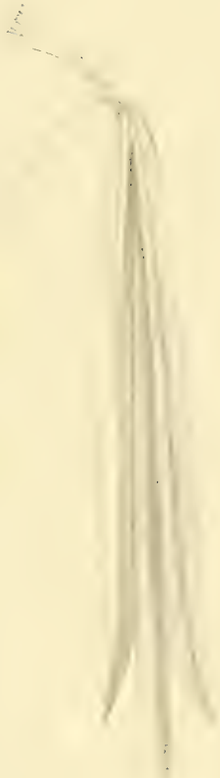


Fig. 4 × 6
C. asturicus.

Fig. 5 × 6.
C. montenegrinus

Fig. 6, [illegible] actual size.
Crocus [illegible] vernus.

Fig. 7, actual size.
C. asturicus.

die away, and the life-cycle is completed with the new corm in the condition of rest, at which the life-history of the plant was commenced.

Morphosis. Nearly every organ of a Crocus has a strong tendency to metamorphosis; generally in an ascending order of change. The case most familiar is the partial conversion of the stamens into pistils, by the presence of a terminal stigmatic appendage to the anther, as in figs. 3 and 4, Plate D. In *Crocus montenegrinus* (Plate XXIII, and Plate D, fig. 5), originally named by Kerner *C. appendiculatus*, this seems to be constant.

The segments also become stigmatic, and also stameniferous. Fig. 1, Plate D, represents a monstrous form of *C. sativus* cultivated by Monsieur Chappellier, of Paris, in which the whole of the segments are converted into pistils and stamens; *a. a. a.* are the proper pistils, *b. b. b.* the proper stamens, *c. c. c.* are stamens representing the inner whorl of segments, and *d. d. d.* pistils representing the outer whorl of segments; the partial conversion of the inner segments into stamens is represented in Fig. 2, Plate D.

This remarkable case has been described in detail by Monsieur M. P. Duchartre (Note sur des Safrans a fleur monstreuse, Journ. Soc. Centrale d'Horticulture de France 3rd. Ser. 1. 1879, p. 471—480). M. Chappellier is endeavouring to turn this monstrous form of *C. sativus* to economic account, in the increased production of Saffron from the segments.

A somewhat similar case of morphosis occurs in a beautiful golden banded variety of *C. vernus*, sent me by Miss C. M. Owen, Knochmullen, Gorey, Ireland, in which a bright golden stigmatic band runs up the centre of each outer segment; and in another example from Miss Owen's garden, the inner segments are stameniferous, and the proper spathe is developed as a perianth segment. (Fig. 6, Plate D.) From Miss Owen's garden I have also received a specimen of the Dutch yellow Crocus (*C. aureus var.*) with the spathe bearing an anther, and with a stigmatic segment; also of *C. aureus*, with two ovaries and flowers on a single scape; of *C. vernus*, with the stamen partially developed as a segment; and of *C. vernus*, in which the style is divided at the throat, and produced into long, nearly entire stigmata, reaching to the level of the summit of the anthers.

Fig. 7, Plate D, represents the dissected spathes and leaves of a monstrous form of *C. asturicus*, in which one of the proper leaves is converted into an extra basal spathe.

CHAPTER II.

CLASSIFICATION AND SEQUENCE.

IN attempting a natural grouping and sequence of the species, a difficulty at once presents itself in the large number of well-marked characters possessed by individual species, which as it were interlace and overlap amongst the other species of the genus. Community of character in one organ, thus brings together a different set of species to those which would be associated by the common characters of another organ. For instance, if we take the structure of the corm-tunic as a basis for classification, it would group together species that would be widely separated by the character of the stigmata; again, the stigmatic characters bring together in close proximity species which have obviously little natural affinity. This difficulty, which presents itself in many genera, seems especially prominent in the genus *Crocus;* and the following tabular analysis shews that the concurrent grouping of several common characters is almost entirely absent, excepting in very small and isolated sections; and it will be apparent that no one method of classification will enable the species to be arranged in strictly natural sequence, or without making obvious gaps, which some other method would more easily bridge over. Any arrangement of the species of the genus must therefore be based on a joint view of all the characters.

The first attempt at classification was by A. H. Haworth, in his account of the genus Crocus, read before the Horticultural Society of London, on February the 7th., 1800, and published at page 122 of the first volume of the *Horticultural Transactions.* In this he grouped the genus under two sections he termed *Piligeri* and *Depilati*, including respectively the species with bearded and unbearded throats; this distinctive character, however, runs in no way parallel with any other well-marked character in the species of the genus.

In 1829, Joseph Sabine, Secretary of the Horticultural Society of London, in his paper, *An account of the Crocuses Cultivated in the Society's Garden*, read January

Tabular Analysis of the Specific Characters of the Genus Crocus.

Number.	Species. [The note of interrogation (?) is inserted where the character differs a little from that indicated at the heading of the column, or where there is some doubt or insufficient information.]	*Involucrati*. Basal spathe present.	*Nudiflori*. Basal spathe absent.	Diphyllous proper spathe.	Monophyllous proper spathe.	Tunic fibro-membranous.	Tunic reticulated.	Tunic annulate.	Tunic stranded.	Spring-flowering.	Autumn-flowering.	Leaves dormant at flowering-time.	Leaves appearing with flowers.	Leaves glabrous.	Leaves ciliated.	Flowers orange.	Flowers other than orange.	*Pilosi*, throat bearded.	*Depilati*, throat unbearded.	Throat orange or yellow.	Throat white or violet.	Anthers orange or yellow.	Anthers white.	Filament orange or yellow.	Filament white.	*Holostigmæ*. Stigma entire.	*Odontostigma*. Stigma slightly divided.	*Schizostigmæ*. Stigma much branched.	Seed butt.	Seed pod.	West of longitude of Venice.	East of longitude of Venice.
1.	iridiflorus	*	...	...	...	?	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
2.	vallicola	*	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
3.	Scharojani	*	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
4.	zonatus	*	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
5.	karduchorum	*	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
6.	nudiflorus	*	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
6 *b*.	granatensis	*	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
7.	asturicus	*	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
8.	serotinus	*	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
9.	Salzmanni	*	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
10.	Clusii	*	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
11.	ochroleucus	*	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
12.	lazicus	*	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
13.	Cambessedesii	*	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
14.	Imperati	*	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
15.	suaveolens	*	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
16.	versicolor	*	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
18.	Malyi	*	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
19.	minimus	*	...	...	...	*	?	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
20.	Boissieri	*	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
21.	corsicus	*	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
22.	etruscus	*	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
23.	montenegrinus	*	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
24.	banaticus	*	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
25.	Tommasinianus	*	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
26.	vernus	*	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
27.	medius	*	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
28.	longiflorus	*	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
29.	sativus	*	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
30.	hadriaticus	*	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
31.	cancellatus	*	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
32.	veluchensis	*	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
33.	Sieberi	*	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
34.	dalmaticus	*	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
35.	reticulatus	*	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
36.	susianus	*	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
37.	stellaris	*	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
38.	ancyrensis	*	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
39.	gargaricus	*	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
40.	Gaillardotii	*	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
41.	carpetanus	*	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
42.	nevadensis	*	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
43.	hyemalis	*	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
44.	hermoneus	*	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
45.	alatavicus	*	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
46.	caspius	*	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
47.	Tournefortii	*	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
47 *b*.	Boryi	*	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
48.	veneris	*	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
49.	lævigatus	*	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
50.	vitellinus	*	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
51.	Balansæ	*	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
52.	Suterianus	*	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
53.	Olivieri	*	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
54.	candidus	*	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
55.	aureus	*	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
56.	Korolkowi	*	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
56 *b*.	Biliottii	*	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
57.	cyprius	*	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
58.	aërius	*	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
59.	biflorus	*	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
60.	Crewei	*	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
61.	tauri	*	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
62.	chrysanthus	*	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
63.	Danfordiæ	*	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
64.	speciosus	*	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
65.	pulchellus	*	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
66.	Fleischeri	*	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
67.	parviflorus	*	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
69		30	39	42	27	34	24	9	2	13	26	10	59	53	16	14	55	16	53	39	30	58	11	44	25	34	12	23	33	31	20	53

6th. 1829, suggested the method of classification which was subsequently adopted and enlarged upon by Dean Herbert, basing his primary divisions by the presence or absence of a basal spathe, and his subordinate groups by the character of the corm tunic; he also further sub-grouped the species by the presence of a single or of a double proper spathe.

Dean Herbert, about the year 1846, adopted for his primary grouping the presence or absence of a basal spathe; subdividing his main groups into sections by the character of the corm tunic. In his *History of the Species of Crocus*, published in the Journal of the Horticultural Society of London, Vol. II, 1847, p. 249-293, this grouping is as follows:—

I. *Involucrati*, including 24 species having an "involucre" (or basal spathe,) below the flowers.
II. *Subnudi*, including 2 species having no "involucre" below the flowers, or a very imperfect one.
III. *Nudiflori*, including 16 species having no "involucre."

The main divisions are divided into the following sections, based on the structure of the corm tunics.

Section 1. Membranacei:	Corm tunic membranous.	
" 2. Parallelo-fibrosi:	" "	of parallel fibres.
" 3. Sub-paralleli:	" "	of confluent parallel fibres.
" 4. Sub-reticulati:	" "	partly reticulate.
" 5. Reticulati:	" "	Reticulate.

Herbert in his sub-grouping seems to have overlooked the essentially distinct character of the corm tunics of the annulate species, which he groups with the Parallelo-fibrosi; and also of the stranded tunic of *C. Fleischeri*, which he places with the Reticulati. The corm tunics of his second, third, and fourth sections are only gradations of the same type of structure, which appear to me too slight for the purposes of classification.

J. G. Baker, in his *Review of the known Species of Crocus*, published in the *Gardener's Chronicle* of 1873, classified the genus by the character and degree of subdivision of the stigmata; as,

Holostigma, species with entire stigmata.
Odontostigma, species with toothed or slightly divided stigmata.
Schizostigma, species with deeply divided and branching stigmata.

with subordinate groups for the spring and autumn flowering species, and those with Cyanic and Xanthic flowers.

I prefer Herbert's method of classification to that of Baker, as community of

character in the stigmata seems to associate the species unnaturally; and there is a greater variety of type than can be properly represented by three groups only: we often find the stigmata, *e. g.* in *C. longiflorus*, varying in individual species with every variety of structure, from being quite entire to being finely sub-divided.

The following grouping of the species I have adopted is based on Herbert's classification, except that I place in a separate section as *Annulati*, those species having an annulate corm tunic; and I separate *C. Fleischeri* and *C. parviflorus*, with stranded corm tunics, under a distinct section I have termed *Intertexti*.

Division I.—Involucrati.

Species with a basal spathe springing at the base of the scape from the summit of the corm.

Section 1.—*Fibro-membranacei*, with a corm tunic of membranous tissue, or of membranous tissue interspersed with nearly parallel fibres.

Autumn Flowering.

1. iridiflorus.
2. vallicola.
3. Scharojani.
4. zonatus.
5. karduchorum.
6. nudiflorus.
6*b*. granatensis.
7. asturicus.
8. serotinus.
9. Salzmanni.
10. Clusii.
11. ochroleucus.
12. lazicus.
13. Cambessedesii.

Spring Flowering.

14. Imperati.
15. suaveolens.
16. versicolor.
18. Malyi.
19. minimus.
(20. Boissieri.)

Section 2.—*Reticulati*, with a corm tunic of distinctly reticulated fibres.

Spring Flowering.

21. corsicus.
22. etruscus.
23. montenegrinus.
24. banaticus.
25. Tommasinianus.
26. vernus.

Autumn Flowering.

27. medius.
28. longiflorus.
29. sativus, and sub-species allied to sativus.
30. hadriaticus.

Division II.—Nudiflori.

Species without a basal spathe.

Section 1.—*Reticulati*, with a corm tunic of distinctly reticulated fibres.

Autumn Flowering.

31. cancellatus.

Spring Flowering.

32. veluchensis.
33. Sieberi.
34. dalmaticus.
35. reticulatus.
36. susianus.
37. stellaris.
38. ancyrensis.
39. gargaricus.
40. Gaillardotii.
41. carpetanus.

Section 2.—*Fibro-membranacei.*

Spring Flowering; lilac or white.

42. nevadensis
43. hyemalis.
(44. hermoneus?)
45. alatavicus.

Autumn Flowering; lilac or white.

46. caspius.
47. Tournefortii.
47*b*. Boryi.
48. veneris.
49. lœvigatus.

Spring Flowering.

50. vitellinus.
51. Balansæ.
52. suterianus.
53. Olivieri.
54. candidus.
55. aureus.
56. Korolkowi.
56*b*. Biliottii.

Section 3.—*Annulati.* Basal tunic of corm separating into annuli.

Spring Flowering.

57. cyprius.
58. aërius.
59. biflorus.
60. Crewei.
61. tauri.
62. chrysanthus.
63. Danfordiæ.

Autumn Flowering.

64. speciosus.
65. pulchellus.

Section 4.—*Intertexti.* (Spring flowering) with a corm tunic of stranded or platted fibres.

66. Fleischeri.
67. parviflorus.

G. Maw delt

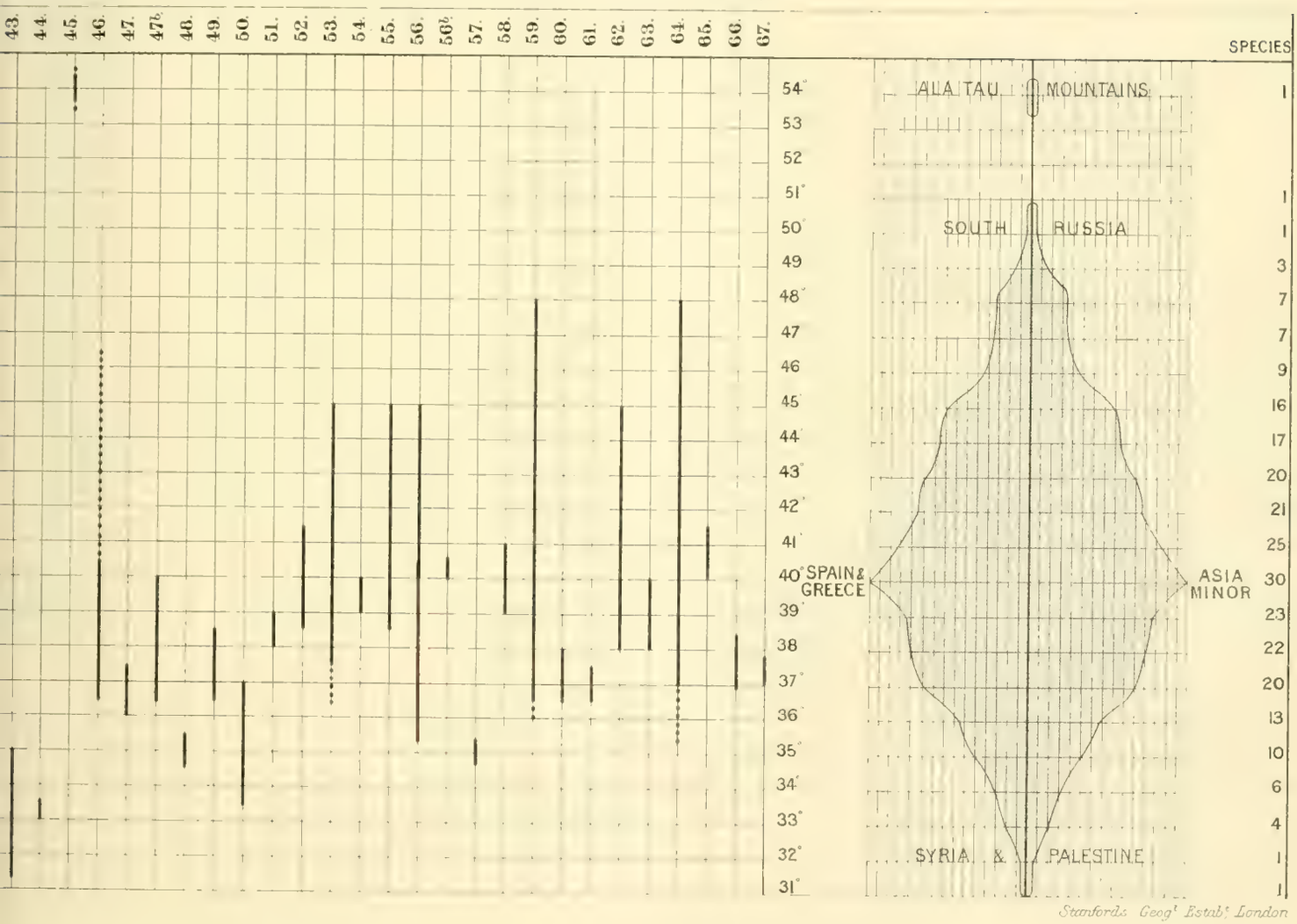
1.	iridiflorus	7	asturicus.	14	Imperati	22.	etruscus	29	sativus
2.	valticola	8	[illegible]	15.	suaveolens	23	montenegrinus	30.	hadriaticus.
3.	Scharojani	9	Salzmanni	16.	versicolor	24	banaticus.	31.	cancellatus.
4.	zonatus	10.	Clusii	18	Malyi	25.	Tommasinianus	32.	veluchensis
5.	karduchorum	11.	ochroleucus	19.	minimus	26.	vernus	33.	Sieberi
6.	nudiflorus	12.	lazicus	20.	Boissieri	27.	medius.	34.	dalmaticus
6b.	granatensis	13.	Cambessedesii.	21.	corsicus	28.	longiflorus.	35.	reticulatus.

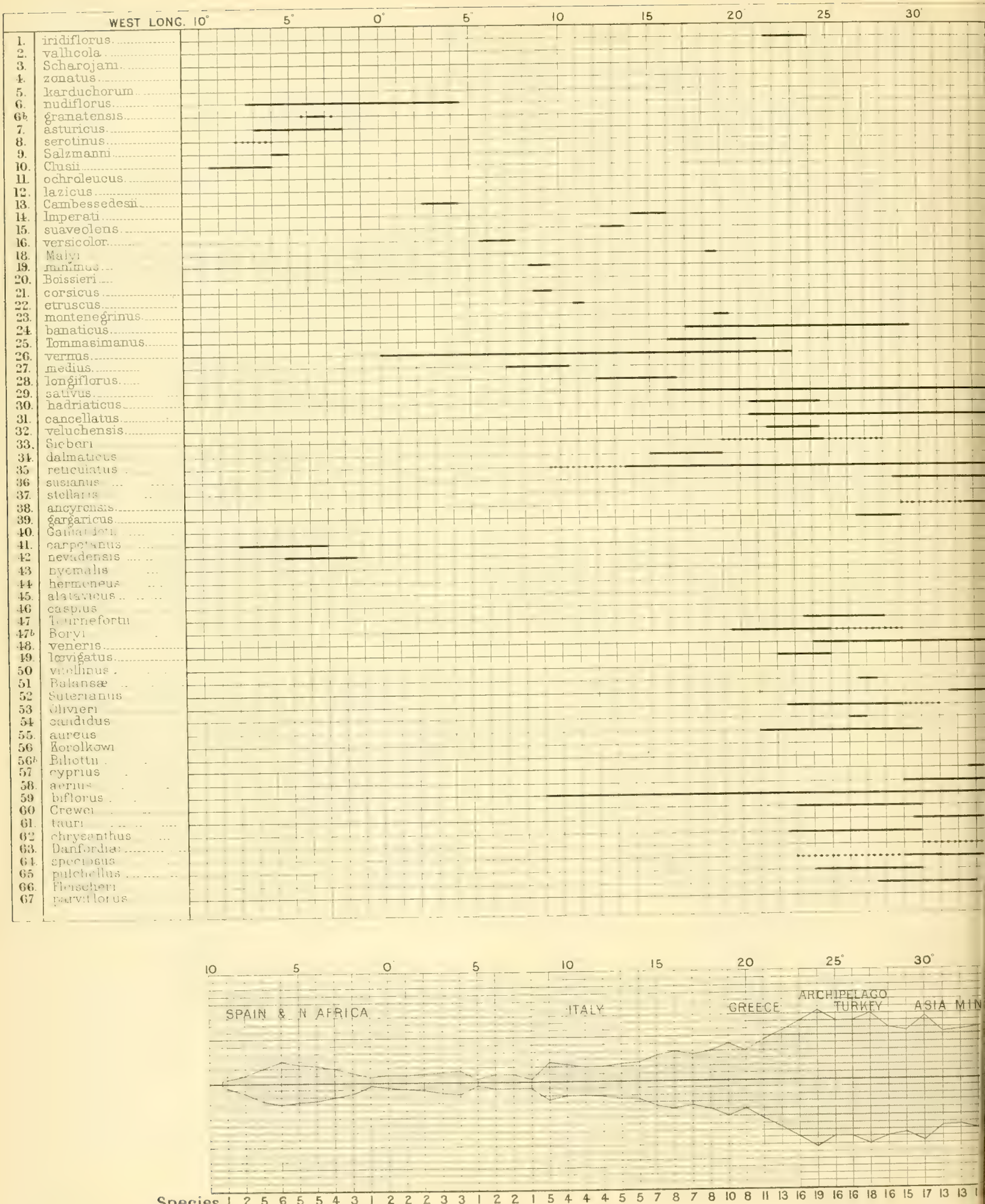
Stanfords Geog.l Estab.t London

36.	susianus.	43.	hyemalis.	49.	lævigatus.	56.	Korolkowi.	62.	chrysanthus.
37.	stellaris.	44.	hermoneus.	50.	vitellinus.	56b.	Biliottii.	63.	Danfordiæ.
38.	ancyrensis.	45.	alatavicus.	51.	Balansæ.	57.	cyprius.	64.	speciosus.
39.	gargaricus.	46.	caspius.	52.	Suterianus.	58.	aërius.	65.	pulchellus.
40.	Gaillardotii.	47.	Tournefortii.	53.	Olivieri.	59.	biflorus.	66.	Fleischeri.
41.	carpetanus.	47b.	Boryi.	54.	candidus.	60.	Crewei.	67.	parviflorus.
42.	nevadensis.	48.	veneris.	55.	aureus.	61.	tauri.		

RANGE IN LATITUDE OF
1. iridiflorus
2. valhedæ
3. Scharojani
4. zonatus
5. karduchorum
6. nudiflorus
6b. granatensis
7. asturicus
8. serotinus
9. Salzmanni
10. Clusii.
11. ochroleucus
12. lazicus
13. Cambessedesi.
14. Imperati
15. suaveolens
16. versicolor
18. Malyi.
19. minimus
20. Boissieri
21. corsicus
22. etruscus
23. montenegrinus
24. banaticus.
25. Tommasinianus.
26. vernus.
27. medius
28. longiflorus
29. sativus.
30. hadriaticus
31. cancellatus
32. veluchensis
33. Sieberi.
34. dalmaticus
35. reticulatus
36. susianus.
37. stellaris
38. ancyrensis
39. gargaricus.
40. Caillardoni
41. carpetanus.
LAT. N. 54
53
52
51
50
49
48
47
46
45
44
43
42
41
40
39
38
37
36
35
34
33
32
31
G. Maw, delt

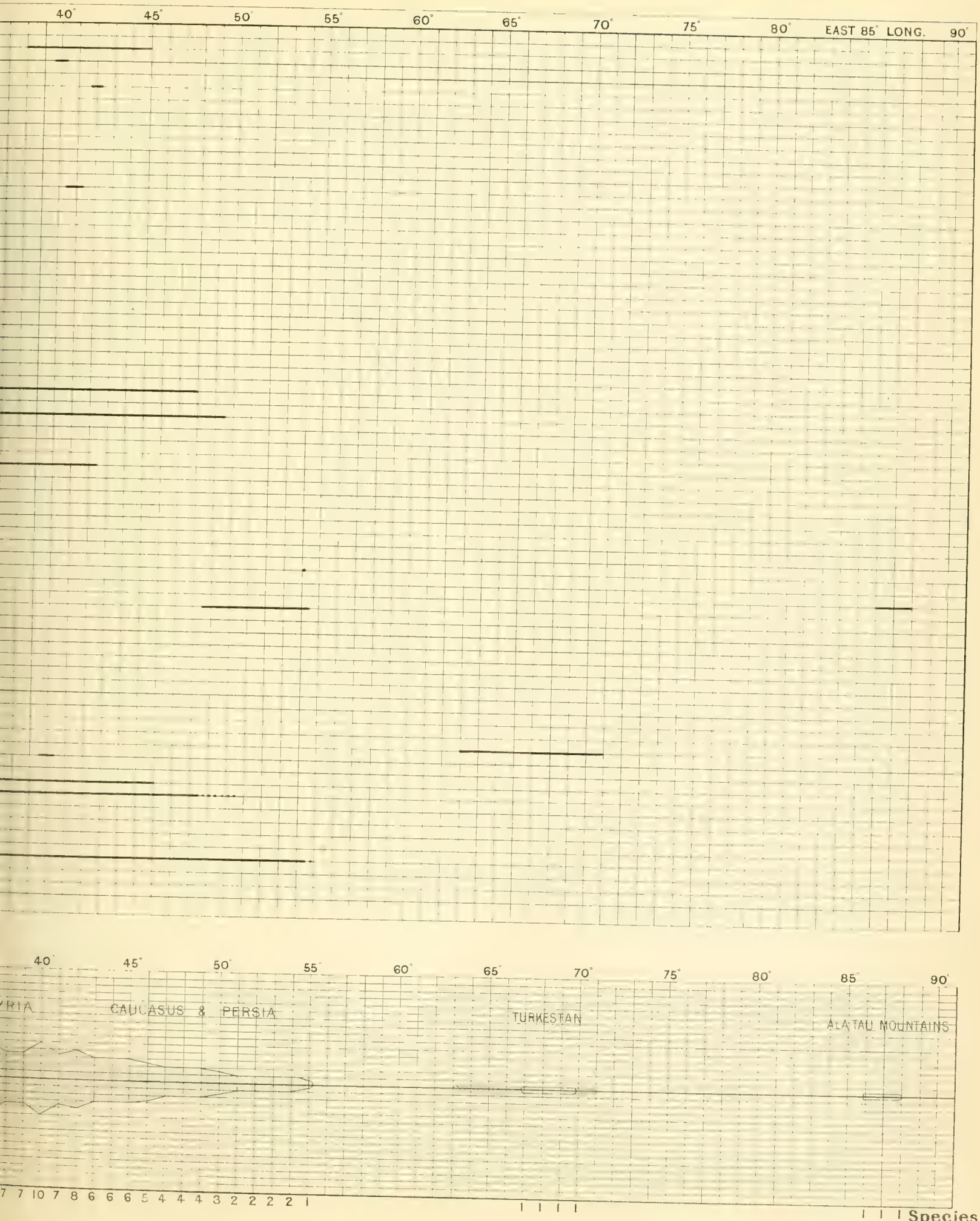
THE SPECIES OF CROCUS.




WEST LONG. 10° 5° 0° 5 10 15 20 25 30
1. iridiflorus
2. valhicola
3. Scharojani
4. zonatus
5. karduchorum
6. nudiflorus
6b granatensis
7. asturicus
8. serotinus
9. Salzmanni
10. Clusii
11. ochroleucus
12. lazicus
13. Cambessedesii
14. Imperati
15. suaveolens
16. versicolor
18. Malyi
19. minimus
20. Boissieri
21. corsicus
22. etruscus
23. montenegrinus
24. banaticus
25. Tommasinianus
26. vernus
27. medius
28. longiflorus
29. sativus
30. hadriaticus
31. cancellatus
32. veluchensis
33. Sieberi
34. dalmaticus
35 reticulatus
36 susianus
37. stellaris
38. ancyrensis
39. gargaricus
40. Gaillardoti
41. carpetanus
42 nevadensis
43 hyemalis
44 hermoneus
45. alatavicus
46 caspius
47 Tournefortii
47b Boryi
48. veneris
49. lævigatus
50 vitellinus
51 Balansæ
52 Suterianus
53 Olivieri
54 candidus
55. aureus
56 Korolkowi
56b Biliotti
57 cyprius
58. aerius
59 biflorus
60 Crewei
61. tauri
62 chrysanthus
63. Danfordiæ
64. speciosus
65 pulchellus
66. Fleischeri
67 parviflorus

10 5 0 5 10 15 20 25° 30°
SPAIN & N AFRICA
ITALY
GREECE
ARCHIPELAGO
TURKEY
ASIA MIN
Species 1 2 5 6 5 5 4 3 1 2 2 2 3 3 1 2 2 1 5 4 4 4 5 5 7 8 7 8 10 8 11 13 16 19 16 16 18 16 15 17 13 13 1

G. Maw, delt.



Stanford's Geog^l Estab^t London

CHAPTER III.

GEOGRAPHICAL DISTRIBUTION.

THE known limits of the genus, which is confined to the Old World in the northern hemisphere, may be approximately stated to be between 9° W. and 87° E. longitude, and 55° N. and 31° N. latitude: the main eastern limit being 50° E. longitude, and the main northern limit 50° N. latitude—the occurrence of *C. alatavicus* in the Ala Tau mountains of Central Asia carrying the genus far north-east of the general area of distribution. *C. Clusii*, in Portugal, is the most western species; *C. hyemalis*, in South Palestine, the most southern species at present known; and *C. Salzmanni*, the most south-western species.

The area of distribution would roughly centre round the Mediterranean and Black Sea coasts, though it does not form an essential feature of what is known as the Mediterranean Flora, many of the species ascending to high ranges of altitude.

The accompanying tables represent the range in latitude, and the range in longitude of each species; and the diagrams the number of the species occurring at each degree of latitude and of longitude.

At longitude 24° East, nineteen species occur, a somewhat larger number than occur to the east or west. 40° North, is pre-eminently the latitude in which the greatest number of species occur, and here we have no less than thirty out of the sixty-nine known species, and both north and south of this zone the numbers rapidly fall off in fairly regular steps. The average range of individual species in latitude is somewhat over three and a half degrees, or about two hundred and fifty miles; and in longitude, somewhat over six degrees, equivalent to three hundred and forty miles in latitude 40.

The proportionate range in latitude and longitude of each individual species is very variable; but it will be noticed from the tables that exceptionally great ranges in longitude are more frequent than in latitude.

A parallelogram of the proportions of Fig. 12. represents the relation of latitude

and longitude (reduced to actual distance) of the average area occupied by each species.

Fig. 12.

Looking at the prevalence of species and to their general wide distribution, the district including Greece, the Greek Archipelego, and Asia Minor, must be looked upon as the metropolis of the genus; for in these regions it forms a more important feature in the flora than the outlying countries to which it extends.

As a means of indicating in a concise form the general range of the species, I propose to divide the region occupied by the genus into six sub-districts, represented by different shades of buff on the map; giving lists of the species occurring in each, and expressing by letters the extension of the species of each district into neighbouring districts.

The division into sub-districts may be to some extent arbitrary, but it has been as far as possible ruled by natural geographical boundaries, or the ascertained range of the more prominent species. Where a species is named in the sub-district lists without a following letter, its occurrence is limited to that district; and where the name of a species is followed by a letter, the letter indicates another district to which it extends.

A. West European and North African district, including Portugal and Spain the Balearic Islands, and France excepting the Alps, Marocco and Algeria.

6. nudiflorus.
6.*b* granatensis.
7. asturicus.
8. serotinus.
9. Salzmanni.
10. Clusii.
13. Cambessedesii.
26. vernus. B. C.
41. carpetanus.
42. nevadensis.

Of these ten species in District **A**, only one *C. vernus*, extends beyond it to the east of the Rhone.

B. Swiss and French Alps, Italy as far east as Venice, Sicily, Malta, Sardinia, Corsica, and neighbouring islands.

14. Imperati.
15. suaveolens.
22. etruscus.
26. vernus. A. C.

16. versicolor.
19. minimus.
21. corsicus.
27. medius.
28. longiflorus. (C?).
29. sativus. C. D.
59. biflorus. C. D.

Of the eleven species in District **B**, three extend beyond it, one both to the west and to the east, and two others to the east.

C. East European district, east of the longitude of Venice, and as far east as the longitude of Odessa, including Dalmatia, the Dunubian Principalities, the Carpathians, Greece, the Ionian Islands, the Greek Archipelago and Crete, and Turkey in Europe.

1. iridiflorus.
18. Malyi.
23. montenegrinus
24. banaticus.
25. Tommasinianus.
26. vernus. A. B.
(28. longiflorus?) B.
29. sativus. B. D.
30. hadriaticus.
31. cancellatus. D. E.
32. veluchensis
33. Sieberi. (D?)
34. dalmaticus.
35. reticulatus. D.
47. Tournefortii.
47.*b* Boryi.
48. veneris. D.
49. lœvigatus.
53. Olivieri. (D?)
55. aureus. D.
(58. aërius?) D.
59. biflorus. B. D.
60. Crewei.
62. chrysanthus. D.
64. speciosus. (D?)
65. pulchellus. D.

Of the twenty-six species in District **C**, fourteen species extend beyond it, two to the west, ten to the east, and two both to the east and to the west.

D. Asia Minor, Cyprus, Kurdistan, the Circassian and Caspian district, including Southern Russia east of the longitude of Odessa, the Crimea, Georgia, the district bordering the west coast of the Caspian Sea, and north Persia.

2. vallicola.
3. Scharojani.
4. zonatus. (E?)
5. karduchorum.
12. lazicus.
20. Boissieri.
29. sativus. B. C.
31. cancellatus. C. E.
(33. Sieberi?) C.
35. reticulatus. C.
36. susianus.
(37. stellaris?)
38. ancyrensis
46. caspius.
(50. vitellinus?) E.
51. Balonsæ.
52. suterianus.
(53. Olivieri?) C.
54. candidus.
55. aureus. C.
56*b*. Biliottii.
57. cyprius.
58. aërius. (C?.)
59. biflorus. B. C.
61. tauri.
62. chrysanthus. C.
63. Danfordiæ.
(64. speciosus?) C.

48. veneris. C.

65. pulchellus. C.
66. Fleischeri.
67. parviflorus.

Of the thirty-two species in district **D**, fifteen species extend beyond it, thirteen to the west, one both to the west and south, and one or two species to the south into Syria.

E. Syria and Palestine.

(4. zonatus?) D.
11. ochroleucus.
31. cancellatus. C. D.
40. Gaillardotii.

43. hyemalis.
44. hermoneus.
50. vitellinus. (D?)

Of the seven species in district **E**, one only, *C. cancellatus*, extends beyond it both to the west and north, and one, or perhaps two others to the north.

F. Central Asia, and east of the Caspian, Ala Tau Mountains, and Samarkand.

45. alatavicus.

56. Korolkowi.

Neither of which occur to the west of the Caspian.

It will be seen that within each of the districts, the east European "**C**" excepted, the endemic species, or those peculiar to each district, exceed in number those that have a wider range; and in the east European district, which forms the centre of the Crocus-Area, the species which are transgressive but slightly exceed in number those that are endemic.

In the centre of the area of distribution of a genus, it is only to be expected that there will occur a greater intermingling of species than on its confines; but in the case of the Croci the isolation of the species at the extreme eastern and western end of the Crocus-Area is remarkable, the species being notably less transgressive into the centre of the area of distribution than the intermingling of species over wider areas within the centre of distribution. I can offer no sufficient explanation of this fact; the West European species (district **A**) are essentially endemic, and so are the Syrian species (district **E**). The two species of Central Asia are naturally isolated, and do not occur in any of the other districts. Of the ten West European and North African species, all are endemic excepting *C. vernus*, which occurs sparingly in the Pyrenees, but is not at home there as in the Alps. Of the six or seven Syrian and Palestine species, all are endemic excepting *C. cancellatus*. It is doubtful whether *Crocus zonatus* really crosses the Cilician boundary, and occurs in Syria; *C. vitellinus* was I believe found by Mrs. Danford

in the Anti-Taurus; but both of these are merely borderers, just passing the geographical boundary.

There is also a remarkable break in the distribution of species at the Adriatic and the longitude of Venice, three species only out of a total of sixty-nine, viz: *vernus*, *sativus* and *biflorus*, and possibly also *longiflorus*, being common to the districts east and west of the Adriatic. The district west of the Adriatic possesses twenty species, sixteen or seventeen of which do not extend further east; and the district east of the Adriatic possesses fifty-three species, forty-nine or fifty of which do not occur to the west of the Adriatic.

Nearly the whole of the species occupy continuous areas, and with the exception of *C. vernus* there is no instance of repeated occurrence in isolated districts separated by wide breaks. *C. vernus* has a range of about 27° of longitude, from the Carpathians to the Pyrenees; and the continuity of its range is somewhat broken in Central France. *C. biflorus* has a wider range of longitude than any other species extending for 40° from Italy into Georgia, and Persia; and the next in order of wide distribution is *C. sativus* in its various forms, extending through 30° of longitude from Italy to Kurdistan, and its distribution is essentialy oriental. The same may be said of the annulate species, which have only one representative, *C. biflorus*, as far west as Italy.

Of the division Involucrati, there are about thirteen vernal, and seventeen autumnal species; and of the Nudiflori, thirty are vernal, and eight autumnal. The orange species all occur east of the Adriatic; of the thirty species of Involucrati, about half occur to the east and half to the west of the Adriatic; and the Nudiflori, with two or three exceptions, are all limited to the region east of the Adriatic.

The genus is remarkable for the wide ranging in altitude of the majority of species, those that are essentially alpine or lowland being comparatively few in number; and I believe there is no single species of the genus that is not perfectly hardy, and capable of enduring any of the extremes of frost and heat of our climate.

Geographical distribution in relation to Natural Affinity.—The grouping geographically of allied species is not general, and the only two notable exceptions present themselves in Western Europe and in Italy.

In the Western European and North African district "**A**" there are six or seven autumnal species; viz: *C. nudiflorus*, *C. granatensis*, *C. asturicus*, *C. serotinus*, *C. Salzmanni*, and *C. Clusii*, all closely allied and forming a compact group; they are all limited to Western Europe and N. Africa, where there are no other autumnal species. Two out of the three vernal species, viz:—*C. carpetanus*, and *C. nevadensis*, are also endemic, and are closely allied in their singular leaf-structure; so that with the exception of *C. vernus*, which is sparingly transgressive from the Alps, the whole of the West European and N. African species are not only endemic,

but both the vernal and autumnal species respectively range themselves into compact groups. In Italy and the Italian Islands, and the Alps, district **B**, the endemic vernal species also form a natural group; but they are associated with *C. biflorus* and *C. vernus* of wider range. Beyond these two cases, I know of no instance in which the majority of the vernal, and the majority of the autumnal species within the same district predominate as natural groups; and as a rule the several types are intermixed. There are however, many striking cases of the geographical isolation of individual species: the Islands of the Mediterranean affording the most conspicuous examples. The remarkable *C. Cambessedesii* is limited to the Balearic Islands; Corsica and Sardinia and the neighbouring islets have two species, *C. corsicus* and *C. minimus*, which do not occur elsewhere; *C. Crewei* with its singular black anthers, occurs in the island of Syra; *C. cyprius*, the only species with a scarlet filament, is confined to Cyprus; and *C. veneris* to Cyprus and Crete.

Of insular varieties of species found on the mainland there are several striking examples.

C. hadriaticus, which in Albania is either pure white, or white with a purple throat, appears in the neighbouring island of Santa Maura with a golden yellow throat; *C. vernus* is represented in the Sicilian mountains by the diminutive *C. siculus;* and *C. Sieberi*, which is self-coloured lilac on the mountains of Greece, appears in Crete, Andros, and some other neighbouring islands with variegated purple and white, or white flowers.

Of the passage in colour from white to blue in one or two species, in their ranging from west to east, I have already referred to; and there are other somewhat similar cases of colour variation running as it were parallel through several species within the same district.

In Dalmatia there is a general absence of the striping and feathering of species, which occur elsewhere with feathered flowers. There are even more marked cases than this of mimetic colouring, and of different species associated in the same habitat putting on some identical special form of colouring. Especially remarkable is the exact identity in colour and markings of the Santa Maura varieties of *C. cancellatus* and *C. hadriaticus*, species which are not nearly allied and the type-colourings of which differ from those of the Santa Maura forms. Another remarkable case is that of the form of *C. cancellatus* found on the Bithynian Olympus in association with *C. aërius*, putting on the exact colouring of its companion; moreover, there is a large series of variations in the markings of *C. cancellatus* which are exactly mimetic of the variations in the markings of *C. aërius*, with which it is associated.

I do not think that these are the result of hybridization, for as far as my observations go I have been unable to detect a wild hybrid crocus; nor do I know

of any authenticated case of the production of garden hybrids. It has been suggested that the sterile *C. stellaris*, an old garden plant, the origin of which is unknown, may be a hybrid between *C. aureus* and *C. susianus;* but mere sterility is not sufficient evidence, as it is within my own experience that many wild species tend to sterility after only two or three years cultivation.

Special characters related to Geographical Association.—In addition to the case of the two Spanish species, *C. carpetanus* and *C. nevadensis*, already referred to, I would notice the remarkable identity of special leaf-structure, in which the keel is developed to nearly the width of the blade in *C. zonatus*, *C. vallicola*, and *C. Scharojani*, three species from eastern Asia Minor, a character found in no other species.

There is also a similar case in relation to special corm-tunic structure. *C. Fleischeri* and *C. parviflorus* both occur in the Taurus, the former also in western Asia Minor; they have few structural characters in common, but the singular stranded tunic is common to them both, and also identical with the tunic structure of one or two eastern species of Xiphium, with which they are geographically associated.

A case of geographical variation in the anther, common to two species, is presented in *C. biflorus*, and *C. chrysanthus:* the anthers of both of these species are normally yellow, but in western Bithynia they both vary with a dark spot at the base of the anther.

The relation of Specific Groups to Geographical Distribution.—The following tabular analysis of the species will concisely explain the relation of specific grouping to geographical distribution; generally exhibiting the geographical intermingling of different types, and an occasional and exceptional association of species that can be grouped by common structural characters.

A. West European and N. West African district, including Portugal and Spain, the Balearic Islands, France, excepting the Alps, and N.W. Africa.

B. Swiss and French Alps, Italy as far east as Venice, Sicily, Malta, Sardinia and Corsica.

C. East European district, between the longitude of Venice, and Odessa, including Dalmatia, the Danubian Principalities, the Carpathians, Greece, the Ionian Islands, the Greek Archipelego and Crete.

D. Asia Minor, Cyprus and Kurdistan, Circassia, the Crimea, Southern Russia east of the longitude of Odessa, the district west of the Caspian, and N. Persia.

E. Syria and Persia.

F. Central Asia and east of the Caspian, Ala Tau Mountains, and Samarkand.

	A.	B.	C.	D.	E.	F.
DIVISION I. INVOLUCRATI.						
SECTION 1. FIBRO-MEMBRANACEI.						
Autumn Flowering.						
1. iridiflorus	.	.	*			
2. vallicola	.	.	.	*		
3. Scharojani	.	.	.	*		
4. zonatus	.	.	.	*	?	
5. karduchorum	.	.	.	*		
6. nudiflorus	*					
6*b*. granatensis	*					
7. asturicus	*					
8. serotinus	*					
9. Salzmanni	*					
10. Clusii	*					
11. ochroleucus	.	.	.	.	*	
12. lazicus	.	.	.	*		
13. Cambessedesii	*	.	.	.	*	
Spring Flowering.						
14. Imperati	.	*				
15. suaveolens	.	*				
16. versicolor	.	*				
18. Malyi	.	.	*			
19. minimus	.	*				
20. (Boissieri)	.	.	.	*		
SECTION 2. RETICULATI.						
Spring Flowering.						
21. corsicus	.	*				
22. etruscus	.	*				
23. montenegrinus	.	.	*			
24. banaticus	.	.	*			
25. Tommasinianus	.	.	*			
26. vernus	*	*	*			
Autumn Flowering.						
27. medius	.	*				
28. longiflorus	.	*	?			
29. sativus, and sub-species	.	*	*	*		
30. hadriaticus	.	.	*			

	A.	B.	C.	D.	E.	F.
DIVISION II. NUDIFLORI.						
SECTION 1. RETICULATI.						
Autumn Flowering.						
31. cancellatus			*	*	*	
Spring Flowering.						
32. veluchensis			*			
33. Sieberi			*			
34. dalmaticus			*			
35. reticulatus			*	*		
36. susianus			*	*		
37. stellaris			*			
38. ancyrensis			*	*		
39. gargaricus			*	*		
40. Gaillardotii			*		*	
41. carpetanus	*					
SECTION 2. FIBRO-MEMBRANACEI.						
Spring Flowering; lilac or white.						
42. nevadensis	*					
43. hyemalis					*	
(44. hermoneus)					*	
45. alatavicus						*
Autumn Flowering; lilac or white.						
46. caspius				*		
47. Tournefortii			*			
47*b*. Boryi			*			
48. veneris			*	*		
49. lævigatus			*			
Spring Flowering; orange, except candidus, *which is white, and* Biliottii, *which is blue.*						
50. vitellinus				*		
51. Balansæ				*		
52. suterianus				*		
53. Olivieri				*		
54. candidus			*			
55. aureus			*	*		

	A.	B.	C.	D.	E.	F.
56. Korolkowi	.	.	.	.	.	*
56*b*. Biliottii	.	.	.	*		
SECTION 3. ANNULATI.						
Spring Flowering.						
57. cyprius	.	.	.	*		
58. aërius	.	.	?	*		
59. biflorus	.	*	*	*		
60. Crewei	.	.	*			
61. tauri	.	.	.	*		
62. chrysanthus	.	.	*	*		
63. Danfordiæ	.	.	.	*		
Autumn Flowering.						
64. speciosus	.	.	*	?		
65. pulchellus	.	.	*	*		
SECTION 4. INTERTEXTI.						
Spring Flowering.						
66. Fleischeri	.	.	.	*		
67. parviflorus	.	.	.	*		
69.	10	11	26	33	7	2

Since the preparation of the accompanying Map it seems probable that the researches of the Afghan Frontier Commission have extended the known range of the genus considerably to the south east of the Caspian. It appears that a parcel of bulbs and seeds recently received at Kew from Dr. Aitchison contained some Crocus corms, a few of which were obligingly sent to me by Sir J. D. Hooker; no particulars, even of locality, accompanied them, but Professor Dyer is under the impression that they were those of a yellow species. A letter from the special correspondent of the *Daily News*, on the Afghan Frontier Commission, which appeared in the *Daily News* of March the 13th., 1885, and dated from Bala Murghab, January 26th., 1885, contains the following paragraph:—"Dr. Aitchison describes Badghis, the part of Afghan Turkestan he has as yet seen.....and in a former letter I have given you an account of it in our march from Kuhsan to

the Kushk Valley.....as a great rolling prairie of grasses and flowers. The natives also attest the accuracy of the Doctor's words as to the flowers, for they say as soon as the cold weather is over, the ground becomes covered over with masses of them. The Crocuses are already beginning to appear." In a second letter from Bala Murghab, dated February 1st. which appeared in the *Daily News* of March the 19th., 1885, it is again stated that "Crocuses were coming plentifully in flower."

The district referred to is situated in about Latitude 36° North, and Longitude 63° East, or about 10° East of the most south eastern point where Crocuses have heretofore been known to occur.

CHAPTER IV.

HISTORY AND LITERATURE.

A WIDE interval in the literature of the genus separates the classical references to Crocus from what has been written from the sixteenth century downwards. In later times, the history of Crocuses may be said to have recommenced *de novo* about the end of the sixteenth century.

The various ancient herbaria consolidated in the Herbarium Sloneanum at the British Museum, at the end of the seventeenth and the early part of the eighteenth centuries, probably contain the earliest records.

It is evident from these that several species of Crocus had been long in cultivation before the early part of the seventeenth century; for they contain, besides species from wild sources, numerous varieties of *Crocus aureus* which are now known to be horticultural forms. The Herbarium of Dr. Uvedale, collected in the seventeenth century, contains such a set of orange varieties, under the title *Varietates Croci verni, and Crocus scoticus* forming a complete series of all the varieties of *Crocus aureus* at present known: amongst which *sulphureus*, *sulphureus pallidus*, and *sulphureus striatus* can be identified. These were certainly not wild species recently introduced, but degenerated horticultural forms of *C. aureus* exactly identical with those we now cultivate, implying a far-back cultivation of the wild *Crocus aureus*. Dr. Uvedale's herbarium also contains an undoubted specimen of *C. Clusii*, under the name of *C. purpureus*, gathered at Lisbon in 1660; of *C. nudiflorus*, under the name of *autumnalis purpureus;* of *C. sativus;* of *C. versicolor*, under the name of *vernus regalis;* and many forms of *C. vernus*, which may have been directly derived from wild sources. The *Hortus Siccus* of Hermann Boerhaave, probably collected at the close of the seventeenth century, contains *C. sativus*, labelled "The right sort of Saffron," also a species labelled *C. autumnalis sub-cærul*, which is apparently *C. nudiflorus;* several varieties of *C. vernus*, and a Crocus under the name of *vernus latiflorus flavus*, which is probably *C. aureus*.

Shakespeare makes no mention of Crocus as a flower; though both he and Spenser, and even earlier writers refer to Saffron.

From William Turner's work on *The Names of Herbes*, published in 1551, it is evident that Crocus was then known as a garden plant. He gives the designation "In greeke, Crokos; in englishe, Saffron, or Safforn; in duche, Saffran; in Frenche, Safrone;" and remarks "it is hote in the second degree, and drye in the fyrst," referring to its supposed medicinal qualities.

In *The Herball, or Generall Historie of Plantes gathered by John Gerard, of London, Master in Chirurgerie*, anno 1597, are figured and described eleven forms of Crocus:—

1. Crocus vernus.
2. Crocus vernus minor.
3. Crocus vernus flore luteo.
4. Crocus vernus flore albo.
5. Crocus vernus flore purpureo.
6. Crocus montanus autumnalis.
7. Crocus montanus autumnalis flore majore albido cæruleo.
8. Crocus autumnalis flore albo.
9. Crocus vernus angustifolius flore violaceo.
10. Crocus vernus latifolius flore flavo strijs violaceis.
11. Crocus vernus latifolius striatus flore duplici.

Of these, Nos. 1, 2, 4, 5, and 9 appear to be forms of *C. vernus;* No. 3 is without doubt *C. aureus;* Nos. 6, 7, and 8 are probably *C. serotinus;* and Nos. 10 and 11, judging from the reticulated tunic, are *C. susianus.*

In Gerard's *Catalogus Arborum* 1596-9, six Crocuses are enumerated:—

C. anglicus, probably *C. sativus.*
C. montanus, = *nudiflorus or serotinus.*
C. vernus flore luteo = *C. aureus.*
C. vernus flore albo
C. vernus flore violaceo } = *C. vernus.*
C. vernus flore vario = *versicolor.*

Five or six species of Crocus were therefore in cultivation in England at the end of the sixteenth century.

Included in the List of Plants gathered in England and Holland by James Newton, are several varieties of *C. vernus*, also *C. sulphureus*, which were cultivated in Holland, as well as in England, during the seventeenth century.

One of the earliest published references to Crocus was by Clusius, in 1590.

Regarding the early literature of the genus, I draw largely on Sabine's well-

known paper in the seventh volume of *The Transactions of the Horticultural Society of London.*

The spring Crocuses, which had been described and figured by the older botanists, Besler, Camerarius, Clusius, Dalechamps, Dodoens, Lobel, Sweert and others, previous to, and at the commencement of the seventeenth century, were collected together in 1623 by Gaspard Bauhin, in his *Pinax* (p.65-67). He grouped the then known species and varieties into three classes, containing twenty-three distinct sorts with sub-varieties, some of which cannot be easily identified. Jean Bauhin also wrote on the genus about the same time.

1629.—Parkinson, in his *Paradisus*, p. 160, first published in 1629, described twenty-seven kinds of spring Crocuses.

1671.—Hertodt's *Crocologia*, published at Jena in 1671, is a curious book on the medical virtues of Crocuses and Saffron. Chapter II. describes about twenty species and varieties of Crocuses known at the time, which he classifies as Autumnal and Vernal. Amongst them can be identified without doubt *C. pulchellus* of Herbert, under the name of *C. constantinopolitanus; C. nudiflorus* as *C. pyrenæus flore obscuro violacco majore exultat; C. aureus*, and many varieties of *C. vernus.*

1693.—In Samuel Gilbert's *Florists Vade Mecum*, seventeen Crocuses are enumerated, amongst which can be identified several varieties of *C. vernus, C. aureus* and its varieties, and *C. susianus.*

I am indebted to Mr. J. H. Krelage, of Haarlem, for much valuable information respecting the Dutch literature relating to Crocuses during the seventeenth century, of which the following is an abridgment.

1610.—Gaspard Pelletier in his work on the plants found and cultivated in the island of Zeeland, published in 1610, refers to *Crocus vernus* as being found wild in the Netherlands.

1611.—I. Th. de Bry in his *Florilegium Novum*, Edition I. of 1611, figures several Crocuses in Plate 1. (Plate XXXIX in the edition of 1612). The figures are said to have been taken from the works of Clusius, Robinus, and Valet. The same plate is given in the *Florilegium Renovatum*, Edition of 1641, and includes several varieties of *C. vernus*, and two yellow species, which may be *C. susianus* and *C. sulphureus.*

1612.—Emanuel Sweert, in his *Florilegium*, published at Frankfort in 1612, and afterwards at Amsterdam, gives two plates of Crocuses; Plate 5, vernal, and Plate 6, autumnal, including probably *C. biflorus, C. vernus, C. susianus, C. versicolor, C. aureus, C. sativus*, and *C. serotinus.* The bulbs and plants represented in the *Florilegium* formed the collection of the German Emperor Rudolph II., and as Sweert sold bulbs at Amsterdam, his *Florilegium* may be looked upon as the oldest illustrated trade catalogue.

1614.—In the *Hortus Floridus* of Crispinus Passœus (Crispin van du Pas), of

which there are several editions in Latin, Dutch, and English, and of which there are rarely found two copies exactly alike, the flowers are arranged in four parts, spring, summer, autumn, and winter; on plate 5 (Spring) are figured:—

1. *Crocus neapolitanus fl. purp. major.*
2. *Crocus vernus purpureus minor,* named Lenten Saffron in the English edition.

Both of these are probably *C. vernus.*
On plate 23, Autumnal,

Crocus fragrans, or C. vulgaris, which is *C. sativus;* and *C. montanus.*

On plate 24, Autumnal,

Crocus byzantinus.
Crocus montanus hispanicus, which is probably *C. nudiflorus.*

On plate 7.d., Winter, are four varieties, including what appear to be single and double varieties of *C. biflorus* ("Silverlack"), and of *C. susianus* ("Goldlack").

The engravings are highly finished, and are from drawings made by Van du Pas from the living plants, obtained at Utrecht, Amsterdam, Haarlem, and Leyden; shewing that the five or six species figured, were in the early part of the seventeenth century widely cultivated in Dutch Gardens.

1621.—*Dapes inemptae of de Moufe-Schans,* by Petrus Hond, published at Leyden in 1621, (a curious octavo volume of 634 pages,) contains a description, in Dutch verses, of the agreeable life at a country seat, with a list of names and descriptions of all the wild and cultivated plants then found at de Moufe-Schans, belonging to John Serlippius, formerly Burgomaster at Axel. At p. 98-100, the verses are devoted to the "Soffraen" Crocus. Amongst the spring flowering sorts, *C. vernus, biflorus, susianus, aureus,* and *sulphureus* can be identified; and amongst the autumnals, with which are confounded colchicums, &c., the true Saffron is referred to as being cultivated in sufficient quantities in Zeeland, rendering it unnecessary to import Saffron from England.

1672.—Abraham Munting in *Waare Oeffening der Planten,* Chapter CLXVIII, p. 380, Edition of 1672, enumerates a number of forms of Crocuses, amongst which can be identified, *vernus, biflorus, susianus,* and the old yellow forms derived from *C. aureus;* also *C. sativus.* He also gives instructions for cultivation; and in his *Naauwkeurige Beschryving der Aardgewassen,* published at Leyden in 1696, he repeats the cultural directions, and devotes a chapter to the medicinal uses of Crocus. In this he refers to *Crocus persicus odoratus flore pleno albo, et rubro variegato,* the sweet

smelling Saffron from Persia, which it is impossible to identify.

Mr. Krelage has in his possession a curious collection of water-colour drawings, anno 1670., entitled *Ad vivum coloribus pictæ atque collectæ curâ, et labore Domini, Henrici D'Acquet Senatoris ac consulis delfensis;* in which are figured two Crocuses:—

No. 77 *Crocus vernus*, 1679, a bright blue crocus with red stamens over-topping the flowers, probably *C. sativus.*

No. 78 *Crocus montanus*, 1679, a pale blue species, which may be *C. nudiflorus*, or *serotinus.*

There is also an old bound book in Mr. Krelage's possession, entitled, *Plusieurs espèces de fleurs dessinées d' après le naturel*, containing a large number of water-colour drawings, anno 1681, for the most part painted by the members of the Holsteyn family, including drawings of several forms of *C. vernus*, a variety of *C. versicolor*, and *C. susianus.*

These old Dutch works, ranging from the early part to the end of the seventeenth century, are of interest, inasmuch as they indicate that at least seven or eight species of Crocus, viz. *vernus*, *sativus*, *nudiflorus*, *serotinus*, *biflorus*, *susianus*, and *aureus* and its horticultural varieties, were generally known, and widely cultivated in Holland at the beginning of the seventeenth century. The existing Dutch collections are scarcely richer in species than they were two hundred and fifty years ago. We are without any reliable evidence of the time at which these species were first introduced to cultivation.

1719.—Tournefort, in his *Institutiones Rei Herbariæ*, vol. i., p. 350, formed a list of the genus, enumerating thirty-four species and varieties.

1731.—Miller, in the first edition of his *Gardener's Dictionary*, printed in 1731, gives the names as well as short descriptions of twenty spring Crocuses; which in the seventh and eighth editions of the work, printed in 1759 and 1768 respectively, he groups as two species and twelve varieties only.

1737.—Linnæus, in his *Hortus Cliffortianus*, published in 1737, at p. 18, separated the autumnal from the vernal Crocuses; but both in the first edition, 1753, and the later edition, 1762, of his *Species Plantarum*, he placed the autumnal or Saffron Crocus and the vernal Crocus as varieties, under the name of *C. officinalis* and *C. vernus* of his sole species, *C. sativus*, all the spring species, including the yellow flowering species, being placed together under the name of *C. vernus.*

1771.—Richard Weston, in his *Universal Botanist*, compiled a list of Crocuses, forty of which appear to be varieties of *C. vernus.*

1791.—Willdenow, in the *Species Plantarum*, (edition of 1797,) recognised the autumnal and vernal species as distinct; but, like Linnæus, he considered all the vernal Crocuses as referable to a single species.

Most of these earlier writings on the genus are of little scientific value, inas-

much as the multitudinous garden varieties of *C. vernus* are placed together with the few other species then known, which are generally difficult to distinguish and identify.

1809.—The first attempt to classify the genus was made by Adrian Hardy Haworth, in a paper entitled "*On the Cultivation of Crocuses, with a short account of the different species known at present.*" The paper was read before the Horticultural Society of London, February 7th., 1809, and published at p. 122, vol. 1. of *The Transactions*, accompanied by a plate (Tab. IV.) of *C. stellaris*. He describes thirteen forms, eight of which Sabine, in his subsequent paper, recognised as species.

These are grouped as *Piligeri*, or species with bearded throats, including *C. vernus* and its varieties; and *Depilati*, those which are unbearded, including "*floribundus*", (apparently *C. aureus*,) *lagenæflorus* (also *C. aureus*), *flavus*, (*sulphureus*), *revolutus*, (*susianus*), *stellaris*, *fragrans*, (*versicolor*), *circumscissus*, (*biflorus*), *nudiflorus*, *serotinus*, and *officinalis* (*sativus*); the last, however, should have been placed under his group *Piligeri*, the throat being bearded.

1817.—The earliest attempt at a monograph of the genus, and the proper separation of the species, was made in 1817, by Dr. K. L. Goldbach, in his *Monographiæ generis Croci tentamen*, *Mémoires de la Société impériale de Naturalistes de Moscou* vol. v. p. 142-161, including descriptions of *C. minimus*, *C. biflorus*, *C. reticulatus*, *C. susianus*, *C. mœsiacus*, *C. aureus*, *C. sulphureus*, *C. versicolor*, *C. serotinus*, *C. sativus*, "*C. autumnalis*," *C. Pallasii*, *C. speciosus*, *C. nudiflorus*, and *C. medius*. The synonymy, however, is somewhat uncertain. In the previous year Goldbach published his *Dissertatio Croci Historiam Botanico-Medicam sistens* (Moscow, 1816, 8vo. 54 pp.).

1826.—Bouché made a similar attempt in his *Gattung Crocus in the Linnæa*, vol. i. p. 227-233, which was scarcely an advance on Goldbach's earlier memoir.

1826.—Antonio Bertoloni published at Bologna his *Descrizione de' Zafferani Italiani.*

1826.—Michael Tenore, in his *Memoria sulle specie e varietà de Crochi della Flora Napolitana*, described and figured four south Italian species: *C. vernus*, *C. pusillus*, (*C. biflorus* of Miller), *C. Imperati*, and *C. Thomasii*. Descriptions of the Italian species were also given in his *Flora Napolitana*, published in 1836.

1827.—To the late J. Gay the science of Crocology is indebted for a series of contributions largely in advance of anything that had been previously done. Gay had collected from wild sources most of the known species and many species new to science, which he for many years cultivated in the garden of the Luxembourg, Paris. He also had a series of between eighty and ninety fine drawings of thirty species, executed by several French artists; these are now in the possession of Sir J. D. Hooker. Gay's first publication was an exhaustive review of Bertoloni's and Tenore's previous writings (*Féruss. Bull. Sc. Nat.*, vol. xi. p. 346-372, Anno

1827); and in 1831 he published his *Novelles espèces de Crocus* (*Féruss. Bull. Sc. Nat.*, vol. xxv., p. 29-225 (39-325), including descriptions of *C. Fleischeri*, Gay; *C. Admi*, ("*affinis biflora*"); *C. Sieberi*, Gay; *C. Boryi*, Gay; *C. Tournefortii*, Gay; *C. banaticus*, Gay (*C. byzantinus*, Parkinson); *C. Clusii*, Gay; *C. Salzmanni*, Gay (*C. tingitanus*, Herbert); *C. Cambessedesii*, Gay; and *C. insularis*, Gay (*C. minimus*, *D.C.*); of these ten species eight had not been previously described.

1827.—J. Bellenden Ker (Gawler), in his *Iridearum Genera* (Brussels, 1827), at page 72, described fifteen Crocuses, namely, *vernus*, *versicolor*, *biflorus*, *susianus*, *sulphureus*, *mæsiacus*, *minimus*, *sativus*, *serotinus*, *byzantinus*, *candidus*, *odorus*, *autumnalis*, and *albiflorus: albiflorus* being a variety of *C. vernus*, and *serotinus* and *autumnalis* probably synonymous. Ker's enumeration would be reduced to about twelve species.

As far as it goes, his work is of value in bringing together the synonymy of the earlier authors: of Clusius, 1590; Parkinson, 1640; Tournefort, 1700-1719; Miller, 1760; Bulliard, 1780; Lamarck, 1785; Vahl, 1790; Redouté, 1802; Sprengel, 1810; and Roemer and Schultes, 1822.

The descriptions of Crocuses in some of the earlier numbers of the *Botanical Magazine* were written by Ker; and the nature and mode of inflorescence of the genus, were described by Salisbury and Ker in the *Annals of Botany*, vol. i. pp. 220 and 221.

1829.—Ajcardo Castiglioni published at Milan his *Monografia dello Zafferano.*

1830.—Joseph Sabine, F.R.S., in the *Transactions of the Horticultural Society of London*, vol. vii. p. 419-498, gave *An account of the most remarkable varieties of Spring Crocuses cultivated in the Garden of the Society*, with an exhaustive summary of the literature of the genus; accompanied by a beautifully executed plate of nineteen varieties, including perhaps five or six species. There are descriptions of about one hundred vernal varieties, mostly those of *vernus;* but they cannot all be identified: species and garden varieties, as in the earlier writings, being intermingled.

The grouping is as follows:—

Class 1.—Spring Crocuses with yellow flowers, including
susianus,
sulphureus, and five sub-varieties,
stellaris,
lagenæflorus,
luteus,
lacteus, and two sub-varieties.

CLASS 2.—Spring Crocuses with various coloured flowers, other than yellow, having the mouths of the flower tubes without hairs, including—
biflorus, and three sub-varieties,
argenteus, and two sub-varieties,
pusillus,
versicolor, and eighteen sub-varieties.

CLASS 3.—Spring Crocuses with various coloured flowers, not yellow, having the mouths of the flower tubes hairy, including *vernus*, and fifty-seven sub-varieties.

These eleven supposed species include but *six* that modern crocologists consider entitled to specific rank, viz:

susianus.

aureus = { *sulphureus*, a pale variety of *aureus*. / *lagenæflorus* = *aureus*. / *luteus* = *aureus*. / *lacteus*, an albino of *aureus*. }

stellaris.

biflorus { *biflorus.* / *argenteus.* / *pusillus.* }

versicolor.

vernus.

Sabine also gives a synopsis of the species, and groups them somewhat on the plan which was afterwards followed by Herbert; the primary divisions being determined by the presence or absence of a basal spathe, and the sub-groups by the character of the corm-tunic: the presence of a single or double proper spathe or bract is also used for further sub-grouping.

1834.—Guiseppe Moretti published at Pavia his *Nonnulla de Crocis italicis.*

Up to the time of Gay, who wrote on the genus from the year 1827 to 1831, scarcely more than from twelve to fifteen species of Crocus seem to have been known.

Gay's observations, especially on the eastern species, brought up the enumeration to about twenty-five species.

The next great advance was by The Hon. and Very Rev. W. Herbert, Dean of Manchester, who wrote on the genus from the year 1841 to 1847, and who was the first to suggest a complete systematic grouping and classification. His first published observations appeared in his *Crocorum Synopsis*, in the *Botanical Magazine* of 1841, *Sub. Tab.* 3861 *et seq.*

In the *Botanical Register*, Vol. XXIX of 1843, plate twenty-one represents a Corsican Crocus under the name of *insularis*, which is probably, however,

C. corsicus. In the *Miscellany* of the same volume, p. 81 to 84, are descriptions of, 126, *C. pulchellus;* 127, *C. nubigena;* 128, *C. lagenæflorus*, var. *hæmicus;* 129, *C. lagenæflorus*, var. *Landerianus;* 130, *C. nivigena*, a supposed var. of *C. vernus* from the Steppes north of Odessa; 131, *C. Cartwrightianus;* and in the *Crocorum Synopsis*, addenda et corrigenda at p. 83, *C. chrysanthus*, *C. speciosus*, *C. Sibthorpianus (= C. aërius)*, *C. lagenæflorus luteus (= C. aureus);* *C. reticulatus*, var. *albicans*, *C. gargaricus*, *C. serotinus*, *C. sativus*, *C. vernus alpinus*, and *C. lusitanicus* of Brotero Fl. Lus. (probably *C. carpetanus)* are described.

In the *Botanical Register* of 1844, Vol. XXX, is a further article on the autumnal Croci; Plate 3, containing figures of *C. pulchellus*, *C. longiflorus* and var. *melitensis*, *C. Thomasianus*, *C. Pallasianus*, and *C. Cartwrightianus*.

In the *Botanical Register* of 1845, Vol. XXXI, *Miscellany*, p. 1-8, are descriptions of *C. damascenus*, *C. intromissus* (? *C. Gaillardotii*), *C. vallicola*, *C. Mazziaricus*, *C. ionicus* (*C. Boryi*, Gay), *C. Cartwrightianus*, *C. Sibthorpianus* (*C. aërius*), *C. Tournefortianus*, var. *veneris* (*C. veneris*), and var. *parvulus*. At p. 10, addenda: *C. Clusianus*, *C. carpetanus*. In the *Miscellany*, p. 31, is a note on *C. vallicola*, and on seedling Croci. In the *Miscellany*, p. 80, *Crocorum synopsis*, addenda, *C. dalmaticus*, *C. veluchensis*, *C. sublimis* (*C. Sieberi*, Gay), *C. cancellatus* var. *margaritaceus*, and var. *Mazziaricus*, *C. ionicus* (*C. Boryi*), *C. vallicola*, *C. hadriaticus* and vars. *chrysobelonicus* and *Saundersianus*, and *C. Visianicus* are described.

In the *Botanical Register* of 1847, Vol. XXXIII, plates 4 and 16, eleven species are figured and described, viz: *C. chrysanthus*, *C. nivalis* (*C. Sieberi*, Gay), *C. veluchensis*, *C. Salzmannianus*, *C. byzantinus*, *C. gargaricus*, *C. reticulatus*, *C. vallicola*, *C. cancellatus*, *C. hadriaticus*, and *C. Boryanus*.

These papers, and some descriptions of species in the *Botanical Magazine*, as well as the series of drawings preserved in the Lindley Library of the Royal Horticultural Society of London, represent the materials Herbert had been gradually accumulating up to the time of his death. Notwithstanding the difficulties of transport at the time, he had imported and cultivated at Spofforth the greater number of the species he described; indeed he had introduced to cultivation fully as many new species as the whole of those that up to the time had been in English gardens.

Herbert's most important work, *A History of the Species of Crocus*, published in Vol. 2, p. 249-293 of the *Journal of the Horticultural Society of London*, a summary of all his previous writings on the genus, was completed only a day or two before his death, and left in the hands of Dr. Lindley for publication. The following note appears on the first leaf of his M.S., "*Crocorum Synopsis* nearly prepared for the Press, and to be printed, if I die before it is sent to press, with or without plates from my drawings as may be found expedient. Consult Dr. Lindley."

Herbert's monograph describes forty-three species, thirty-eight of which are now accepted as species. We must remove from specific rank *C. Visianicus*, which was probably a form of *C. longiflorus;* the late Professor Visiani, after whom it was named, doubted its specific distinctness. *C. Pallasii* and *C. Thomasii* must be placed as varieties of *C. sativus; C. damascenus* is merely the blue eastern form of *C. cancellatus;* and *C. intromissus* is difficult of identification. Herbert describes it as a smooth-leaved variety of *C. sativus;* but it may possibly be identical with *C. Gaillardotii*, more recently described by Boissier and Blanche. In addition to the thirty-eight Crocuses described by Herbert (which are now acknowledged as species) he refers to seven other forms as varieties, which should be placed as species.

These are:—

C. insularis var. major, which is *C. corsicus.*
C. reticulatus var. auritextus, which is *C. susianus*, Ker.
C. reticulatus var. ancyrensis, which is a separate species.
C. lagenæflorus var. syriacus, which is *C. vitellinus*, Wahl.
C. lagenæflorus var. Olivierianus, which is *C. Olivieri*, Gay.
C. lagenæflorus var. candidus, which is *C. candidus* of Clarke.
C. veneris } placed by Herbert as synonymous with
C. caspius } *C. Boryi*, but now specifically separated.

This would bring up the enumeration of species, described as species, or referred to by Herbert as varieties, to forty-five or forty-six, or about twenty additional to those previously described by Gay, and the earlier writers.

From the time of Dean Herbert's *History of the Species of Crocus*, to the year 1873, when Mr. J. G. Baker wrote his *Review of the Known Species of Crocus*, in the *Gardener's Chronicle*, there was no separate publication on the genus.

From the year 1853 to 1859, M. Boissier published in his *Diagnoses plantarum orientalium novarum*, series 1 and 2, descriptions of several, some of them new, species, including *C. Aucheri*, *C. candidus* (*C. Fleischeri* of Gay, not *C. candidus* of Clarke), *C. Pestalozzæ*, *C. thessalus* (*C. Sieberi*, Gay), *C. hyemalis*, *C. micranthus*, *C. peloponnesiacus*, *C. ochroleucus*, *C. Sieberi* var. *atticus* and *C. syriacus*, (*C. vitellinus*, Wahl.) *C. carpetanus* was described by Boissier in 1842, in Boissier and Reuter's *Diagnoses plantarum novarum hispanicarum.*

Descriptions of forty-four Eastern species are given in Boissier's *Flora Orientalis*, Vol. V, p. 94 to 115.

In Reichenbach's *Icones Criticæ*, and *Icones Floræ Germanicæ*, are numerous figures and descriptions of Croci.

In 1858, Professor Filippo Parlatore, in Vol. III, p. 218-241 of his *Flora Italiana*, described very fully and accurately the twelve Italian species, including

C. etruscus, of which he was the discoverer.

1860.—Paul de Tchihatcheff, in his great work *Asia Mineur*, Part III, Botany, Vol. II, p. 520-525, described thirty-one Eastern species; but both the synonymy and the descriptions are unreliable.

1865-6.—Dr. J. W. Klatt, in his *Revisio Iridearum*, published in Vol. XXXIV of *The Linnæa*, enumerates only twenty-eight species, that is to say less than two thirds of those well known at the time. His descriptions are strangely inaccurate, and full of errors, both as to the synonymy of the species, and their geographical distribution.

1866.—F. J. Ruprecht described *Crocus Scharojani* in Regel's *Gartenflora*, Vol. XVII, p.p. 134-5, Tab. 578.

1868.—Professor K. Koch read at the meeting of the British Association at Norwich, a paper on the *Classification of the Species of Crocus*. (Report p. 102, and published *in extenso* at p. 966 of the *Gardener's Chronicle*, September 12th., 1868). K. Koch also described *C. chrysanthus*, of Herbert, under the name of *C. croceus*, in the XIXth. Volume of *The Linnæa;* and *C. cancellatus*, of Herbert, as *C. dianthus*, in the XXIst. Volume of *The Linnæa*.

1869.—Regel and Semenow described *C. alatavicus*, the first species found east of the Caspian, in Regel's *Plant. Semenovianæ*, IV, No. 1036.

Herbert's *History of the Species of Crocus*, published in 1847, must, as a monograph dealing with the entire genus, be looked upon as unsuperseded up to 1873, the date of the publication of Mr. Baker's *Review of the Species of Crocus*, which appeared in Nos. 4, 6, 9, 13, 16, 18, 20, 43, 44, 46, and 49 of the *Gardener's Chronicle* of 1873. The information brought together in Baker's valuable *Synopsis*, has largely lightened the labour of preparing this work. I am also personally indebted to Mr. Baker for much valuable help and advice in deciding many critical points in the determination of species.

Baker enumerates in his *Synopsis* forty-seven species; and after deducting from Herbert's enumeration of forty-three species the ten species which Baker treats as synonymous or as varieties, the latter writer added fourteen species to those known to Herbert in 1847.

Few exceptions can be taken to Mr. Baker's careful memoir; but the materials from which he worked were for the most part limited to Herbarium specimens. The cultivation and study of the living plants compel me to depart somewhat from his specific determinations.

C. ancyrensis of Herbert, which both Herbert and Baker place as a variety of *C. susianus*, I consider entitled to separate specific rank.

From *C. minimus* of De Cand., which is confined to the west side of Corsica and to parts of Sardinia, I separate the mountain plant from the ranges above

Bastia as *C. corsicus*. *C. veluchensis* of Herbert, identical with Janka's *C. balkanensis*, must I think be retained as a species distinct from *C. Sieberi*.

C. algeriensis of Baker is without doubt identical with *C. atlanticus* of Pomel, and also with the South Spanish *C. nevadensis* described by Amo and Campo in 1861; I therefore retain Amo and Campo's earlier name.

C. etruscus of Parlatore is without doubt a species quite distinct from *C. reticulatus*.

With Mr. Baker's approval, I group *C. Cartwrightianus*, of Herbert, *C. Pallasii* (M. Beib), and *C. Thomasii* (Tenore) as varieties of *C. sativus*.

I think it is doubtful whether *C. peloponnesiacus* of Orphanides can be properly separated from *C. hadriaticus* of Herbert. *C. karduchorum* of Kotschy is a species distinct from Gay's *C. zonatus*.

I think it is doubtful whether *C. Olivieri* of Gay, and *C. Aucheri* of Boissier are identical. Baker places them as one species, but Boissier in his *Flora Orientalis* places his *C. Aucheri* as synonymous with Herbert's *C. Suterianus*.

C. aleppicus of Baker is without doubt identical with Boissier's *C. hyemalis* var. *Gaillardotii*, to which I give specific rank as *C. Gaillardotii*. Boissier in his *Flora Orientalis* also separates it as a species.

C. Pestalozzæ of Boissier is distinct from *C. aërius*, and I place it as an albino of Herbert's *C. nubigenus*, which is a variety of *C. biflorus;* Boissier also in his *Flora Orientalis* places it as a variety of *C. biflorus*.

C. cyprius of Boissier and Kotschy must be retained as a species quite distinct from *C. aërius*.

The Spanish autumnal Croci approach each other very closely; and I feel some doubt about separating Gay's *C. Salzmanni* as a species distinct from *C. serotinus* of Salisbury, of which Baker makes it a variety.

C. damascenus of Herbert, which Baker also accepts as a species, I can only view as the Eastern blue form of *C. cancellatus*.

C. vitellinus, of Wahlenberg, and *C. syriacus*, of Herbert, I place as the self-coloured and bronzed forms of one species. M. Boissier also unites them in his *Flora Orientalis*, but describes the Aleppo plant as a distinct species, under the name of *C. graveolens*.

C. candidus of Clarke, which Boissier, followed by Baker, places as synonymous with *C. Fleischeri* of Gay, is another species allied to *C. aureus*.

Baker places *C. veneris*, Tappeiner, as synonymous with *C. Boryi*, Gay; and *C. lævigatus*, Bory and Chaub, *C. Tournefortii*, Gay, and *C. Orphanidis* of Hooker, as varieties of *C. Boryi*.

C. lævigatus, with its hard coriaceous corm-tunic, is a species undoubtedly distinct from any other of this group; and *C. Orphanidis* is I think identical with

C. Tournefortii of Gay.

C. asturicus, Herbert, is I think entitled to specific rank; and it is more nearly allied to *C. serotinus* than to *C. nudiflorus*.

In addition to Baker's *Review of the Known Species of Crocus*, in the *Gardener's Chronicle*, the species were again enumerated by him in his *Classified Synonymic List of all the Known Crocuses* which appeared in the fourth volume of the new series of the *Journal of the Royal Horticultural Society of London*, in 1877, and in 1878, in his *Systema Iridaceæ*, in the sixteenth volume of the *Journal of the Linnean Society* (Botany, p. 79 to 85) including a classified list of the genus, extending it to fifty-one species.

Baker also described in the *Gardener's Chronicle* some varieties of *C. chrysanthus*, *C. etruscus*, and *C. algeriensis* (*C. nevadensis*, *Amo* and *Campo*). In the *Journal of Botany*, No. 165, pp. 365-366, appeared his description of *C. parviflorus* discovered in the Taurus by Mrs. Danford; and in the *Botanical Magazine*, descriptions of *C. minimus* and *C. Fleischeri*, Tab. 6176, *C. Boryi*, 6187, *C. banaticus* (as *C. veluchensis*), 6197, *C. Weldeni*, 6211, *C. etruscus*, 6362, and *C. vitellinus*, 6416.

Sir J. D. Hooker wrote the descriptions in the *Botanical Magazine* of *C. Orphanidis* (Hooker) = *C. Tournefortii*, (Gay) Tab. 5776, *C. Salzmanni*, 6000, *C. Olivieri*, 6031, *C. Sieberi*, 6036, *C. byzantinus*, 6141, *C. chrysanthus*, 6162, and *C. Crewei* (Hooker), 6168; and Professor W. T. Dyer the description of *C. cancellatus*, 6168.

My own publications on Crocuses, commencing in 1876, are as follows:—

In *The Gardener's Chronicle, New Series.*—

On Vernal Croci, April 22nd., 1876, p. 536.

Corsican Crocuses; C. corsicus, and *C. minimus*, February 24th., 1877, p. 246.

Notes on New Croci, 1879, p. 234-6.

Summer-flowering Orange Croci, C. Scharojani and *C. lazicus*, Aug. 9th., 1879, p. 176.

A New Crocus, C. Korolkowi, from Turkestan, April 24th., 1880, Vol. XIII, p. 531.

A Red Crocus, C. Imperati, var. *Reidii*, 1881, Vol. XV, p. 371.

A Synopsis of the Genus Crocus, 1881, Vol. XVI, in which I brought up the enumeration of the species to 69.

In *The Garden.*—

On Crocus minimus, March 13th., 1875, No. 173, p. 214.

On Crocus etruscus, April 1st., 1876, No. 228, p. 301.

On Winter and Early Spring Crocuses, November 9th., 1878, Vol. XIV, p. 420, Tab. CLIII.

Notes on Crocuses, Vol. XV, p. 133.

On a Golden Striped White Crocus, February 28th., 1880, p. 197.

Article on *Crocuses* January 28th., 1882, Vol. XXI, No. 532, p. 66.

Description of *C. Korolkowi*, Regel and Maw, in Regel's *Descript. Pl. Nov.*, *Fasc.* VII, p. 213.

The Life History of a Crocus, and the Classification and Geographical Distribution of the Genus, read before the Linnean Society, January 19th., 1882; *Jour. Linn. Soc. Bot.*, Vol. XX, p. 348, and in abstract in the *Journal of Botany*, New Series, Vol. XI, No. 231, p. 87, and No. 232, p. 125.

On the Geographical Distribution of Crocuses and notes on Cultivation, read before the R. Hort. Soc. of London, June 12th., 1883, and published in the *Gardener's Chronicle*, New Series, Vol. XIX, p. 751.

CHAPTER V.

THE CULTIVATION OF CROCUSES.

CULTURAL directions for a genus so easily grown seem almost superfluous; but there are a few points to which it may be convenient to refer in dealing with Croci as decorative plants. Taking the whole genus of about seventy species, they must be viewed as in continuous succession, from the beginning of August till April. Of these it is only the earlier autumnal, or the distinctly vernal species that can be relied upon in our climate for open-air garden decoration. Although all are hardy, and most of the winter flowering species will flower in the open ground, those that flower in November, December, and January are so liable to injury by frost and rain, that they are practically worthless as decorative plants for the open garden.

For such, as well as for the less robust and less floriferous species, the protection of a brick pit is necessary. The bottom of the pit should be well below the level of the ground, and it should be filled up with about one foot in depth of fine river silt or sandy loam, the surface of which should be a little below the level of the surface of the adjacent ground. Proper drainage is essential; but this being attained, Crocuses during their period of growth delight in a uniformly moist subsoil. *Crocus vernus* in the Alps is more vigorous in hollow, moist places than on the projecting dryer ground. It is convenient to separate each species by strips of slate or tiles, which may be buried below the surface, and the corms planted about three or four inches deep. A mulching of rotted Cocoa-nut fibre or finely sifted peat keeps the surface uniformly moist, and prevents the substratum of loam from clogging or caking on the surface. At the time of maturity of the foliage, which generally takes place about the end of May, water should be withheld, and the Crocus bed should be covered up and allowed to get quite dry, till the end of July, when a copious watering may be given, or the pit exposed to natural rainfall. Crocuses are easily multiplied from seed, which should be sown as soon as ripe in

July. Germination, however, will not take place till the natural growing period of the species. The autumnal species vegetate in the autumn and the vernal species in the spring succeeding the summer or autumn in which they are sown; but some of the seeds lie dormant for one, two, or even three years before they vegetate. Seedlings take from two to three years to arrive at maturity. They should be left for the first two years undisturbed in the seed bed, and then taken up and replanted. The replanting of the old corms every year, or every other year is advantageous; and the clearing of the corms from the superfluous tunics, and the remains of the old decaying corms seems to encourage a vigorous growth.

Of the autumnal species suitable for the open border the following may be enumerated for successional flowering:—

C. Scharojani, orange; early in August.
" vallicola, straw coloured; late in August and early in September.
" nudiflorus, blue; September.
" pulchellus, lilac; September and October.
" speciosus, blue; September and October.
" iridiflorus, blue; September and October.
" Salzmanni, " asturicus, " Clusii } lilac or blue; October and November.
" cancellatus
" Cambessidesii, " sativus, " hadriaticus } in the late autumn.

These are succeeded by a long series of late autumnal, winter, and early vernal species, which are best grown to advantage under the protection of a brick pit.

Of the vernal species suitable for the border, the earliest is *C. Imperati*, flowering in February, followed by

C. susianus, or Cloth of Gold, in February.
" biflorus, " corsicus, " etruscus, " suaveolens, " versicolor, " vernus, " Tommasinianus, " dalmaticus, " banaticus, " Sieberi and var. versicolor, " chrysanthus, " aureus, " sulphureus } Flowering from the end of February to the first week in April.

" sulphureus pallidus and
" striatus
" stellaris
" Olivieri
" minimus
" Balansæ

} Flowering from the end of February to the first week in April.

Of the Croci recently introduced, many more of the vernal species will probably be found suitable for spring garden decoration, but in the above lists I have given only those which are more generally known and easily obtainable.

Holland, with its rich, light, alluvial soil, and Lincolnshire, with its "Trent warp," have been for many generations the sources from which the English market has been supplied with the varieties of the three or four species grown in English gardens. The last eight or nine years have put us in possession of nearly the whole of the known species of the genus, and they must be commended to the care of the Dutch and Lincolnshire bulb growers wherewith to further enrich our collections.

In collecting and transmitting wild Crocus roots, it is necessary to bear in mind the stage of growth of the plant. At the flowering-time the young corm is just beginning to be formed, and if the growing of the plant is interrupted, the little bud-like corm is likely to perish, especially if the plant is dried. Crocuses in flower should in packing be tied up in bunches, with a little damp moss, and kept, as far as possible, in a growing condition. In the later stages of growth, the new corm rapidly approaches an independent maturity. Crocuses dug up after the flower has completely passed away should be packed dry, and before planting, cleaned of the decaying foliage and tunics, also of the remains of the last year's corms. The smallest partially-developed corms, even of the size of a pea, unless kept too long dry, will vegetate, and soon grow into large, full-sized corms.

It is probable that there are yet many undescribed species to be discovered and introduced. Asia Minor is the metropolis of the genus; and I would especially point out to travellers, the southern part of Asia Minor between Syria and Lycia, as being likely to afford new species. The north eastern extremity of Cyprus, The Taurus, Kurdistan, north west Persia, and the district east of the Caspian have been little explored, and are likely to afford some new species. Should travellers meet with any Crocuses in these districts, I shall be grateful if they will transmit them to me.

The following is a list of the species not yet introduced, or lost to cultivation, the roots of which are much desired by the author.

Crocus iridiflorus, (Plate I.) The white variety gathered by Dr. Wierzbicki near

Cziklova, in the Banat; its introduction is very desirable.

Crocus karduchorum, (Plate V.) Discovered in flower by Theodore Kotschy, on the 27th., of September, 1859, on a mountain ridge, at an altitude of six thousand feet, between Müküs and Sherwan, in Kurdistan, south of Lake Van.

Crocus granatensis somewhat resembles *C. nudiflorus* of North Spain; but the corm is much larger, and without stolon growths. It is a native of the Sierra Tegeda, and the mountains of Granada, at an altitude of from four thousand to six thousand five hundred feet, and flowers in September and October.

Crocus serotinus, (Plate VIII.) from a wild source. I have been unable to find in herbaria any wild specimens of this old garden plant. It is probably a south Spanish species.

Crocus lazicus, (Plate XII.) Discovered by M. Balansa in moist meadows above the villages of Djimel, south east of Trebizond, at an altitude of about eight thousand five hundred feet; flowering in June (or August?). Djimel can be approached from Rizas, a small sea-port twenty-five or thirty miles east of Trebizond. After going inland to Andon, you ascend through forests of *Abies Nordmanniana*, and thickets of *Rhododendron caucasicum* and then cross a bare alpine ridge, at a height of between ten and eleven thousand feet. By the side of a zigzag path about eighteen hundred feet below and to the south of this ridge, before you descend to Djimel, *C. lazicus* was found.

Crocus Boissieri, (Plate XX.) is only known from a single imperfect specimen in M. Boissier's Herbarium, collected by the Russian Traveller Tchihatcheff, near the Cave of Corycus, (modern Korghoz) in Cilicia, on the 30th. of June, 1853.

Crocus montenegrinus, (Plate XXIII.) A vernal species, discovered by Herr Maly on Mount Orgen in Montenegro.

Crocus sativus, var. *Haussknechtii*. Collected by Haussknecht, at an altitude of five thousand feet, on Delechani and Saugur, calcareous mountains between Kermanchah and Hamedan, in Western Persia; and on October 18th., 1865 at Kharput in Kurdistan.

Crocus veluchensis, (Plate XXXII.) occurs at high elevations in Greece and Turkey, Mount Parnassus, Mount Corax, at an altitude of from six thousand to seven thousand feet, the summit of Tymphrestus (Velugo, Veluchi, Velukhi), in Ætolia, and near the melting snow in the upper regions of the Balkans (Hæmus), above the village of Kolafer in Northern Thrace; flowering about the end of May.

Crocus reticulatus, var. *micranthus*, (Plate XXX^{b}.) A native of Cilicia.

Crocus stellaris, (Plate XXXVII.) An old garden plant, the origin of which is unknown.

Crocus Gaillardotii, (Plate XL.) A small winter-flowering species from northern Palestine and Syria, Djebel Nahor, (Gebel Nahas), one hour north-west of Aleppo,

Djebjennine, Scanderun, near Sahara *Anti-Libanus* between Damascus and Dimar, on the plateaux separating Dimes (Dimâs) from Barrada (Barada), Maarra, Maraba, mountains above Beyrout, above Saida (Sidon), and the Valley of Ouadi el Harir.

Crocus hermoneus, (Plate XLIV.) is only known from fruiting specimens discovered by Theodore Kotschy amongst the melting snow, at an altitude of nine thousand feet, near the summit of Mount Hermon. It is probably a vernal species, and appears allied to *C. hycmalis*. It would be very desirable to obtain it in flower, and to introduce it to cultivation.

Crocus caspius, (Plate XLVI.) is a native of the Western and Southern coasts of the Caspian; flowering in October and November, and sometimes as late as April. It has been found near Astrabad, in shady places under bushes near the shore of the Caspian; near Recht; Astora; Lenkoran; and Bakan. It is known in Persia under the native name of *Gul shir páuir*.

Crocus veneris. (Plate XLVIII.) A diminutive species flowering in November on the slopes, between Ktima and the sea, of the hill country, near Paphos, Cyprus. It has also been found in Crete.

Crocus candidus, (Plate LIV.) is an early vernal species, and was originally discovered in 1806, by Dr. E. D. Clarke, on the flanks of Mount Gargarus or Kaz Dagh, one of the heights of Mount Ida in the Troad; and afterwards by Dr. Kirk, near Renkioi near the Dardanelles. A plant gathered in fruit at Thymbra, in the valley of the Scamander may also be this species.

Crocus cyprius, (Plate LVII.) was discovered by Theodore Kotschy early in April, 1859, in or above the wooded region of the Cyprian Olympus, above the village of Prodromos in the direction of Trodos, at an altitude of about five thousand feet. Its scarlet filament distinguishes it from any other species.

Crocus Creweі, (Plate LX.) was discovered by Mr. Elwes, on the hill above the old town of Syra, in the Greek Archipelago. I have also seen specimens which appear to be of this species from Mount Hymettus, Mount Elmalie in Lycia, and Mount Malevo in Laconia.

Crocus tauri, (Plate LXI.) was discovered and collected by Aucher-Eloy near the Cilician Gates of the Taurus (specimens, Nos. 2128 and 2654). There is a specimen in the Kew Herbarium collected by Mr. Elwes on April 9th., 1874, at an altitude of between five and six thousand feet, near the saw mills in the open parts of the Cedar Forest of Ænoni, on the north side of the Pass across the Ak Dagh, on the road from Kassaba to Assa, Lycia. It will probably be found in the district intervening between Lycia and Cilicia. It resembles a large self-coloured variety of *Crocus biflorus*, but the corm tunic is less rigid, and it is easily distinguished by its short, spreading, pale yellow stigmata.

Crocus parviflorus, (Plate LXVII.) a very diminutive, vernal species with

stranded or platted corm tunic; discovered by Mrs. Danford in March and April, 1877, on a steep earthy slope under Fir woods, about a mile to the south-east of Anascha, in the Cilician Taurus, at an altitude of about four thousand feet. The only existing specimens are in the Kew Herbarium.

CHAPTER VI.

SAFFRON: ITS HISTORY, CULTIVATION AND USES.

AS a preface to the evidence of the great antiquity of Saffron as a cultivated plant, there are several facts connected with its geographical range and its characters that call for special notice.

Firstly, no wild form of *Crocus sativus* is precisely identical with the Saffron Crocus. The latter is invariably sterile unless fertilized with the pollen of one of the wild forms.

Secondly, the Saffron Crocus as a cultivated plant, or an escape from cultivation, has a much wider range than the wild forms; extending through at least 125° of longitude, from Spain to Kashmir, and China, and 25° of latitude from Persia to England; whereas the wild forms do not range through more than 36° of longitude, and about 10° of latitude.

Thirdly, whilst the wild forms of *Crocus sativus* are extremely varied—so varied as to have been viewed as distinct species by the earlier writers—the cultivated Saffron, whether from Spain, Kashmir, or China, maintains an identity of character rarely found in any other domesticated plant.

The only possible exception is the reputed occurrence of wild Saffron ("*C. sativus savauge*" of Tenore, *C. Orsinii* of Parlatore, Plate XXIX, figs. 1 and 6) on Monte de' Fiori, and one or two other places near Ascoli, Italy; which differs from the cultivated Saffron in no respect excepting that the pistil is a little more erect, and somewhat shorter; but as Saffron has long been grown on the flanks of the Appenines, up to the height at which Orsini's Crocus was gathered, it may be merely an escape from cultivation.

Indeed the history of the origin of the Saffron Crocus is about as little known as the history of the origin of wheat.

The occurrence of words indicating the Crocus plant and the Saffron product, or both in common, in numerous ancient languages affords evidence of the wide-

spread acquaintance with Saffron; indeed, it would be difficult to point out any other plant the names of which occur in an equal number and variety of languages.*

In *Canticles* IV. 14. Saffron כַּרְכֹּם, Karkom is named but it may have been an imported drug, like the spices named in the context. There is no other evidence that Saffron was cultivated in Syria and Palestine in the time of Solomon.

We know it to have been grown in Syria soon after the Christian Era (see references in *Löw's Aramaische Pflanzennamen*, p. 215, which speak of whole fields of *Kurkama* in Syria).

Its occurrence as a cultivated plant in Syria was also referred to in 1582 by Hakluyt (*English Voiages*, &c., Vol. II.), as follows, "Saffron groweth fifty miles from Tripoli, on an high hyll called in those parts Gasian, so as there you may learn at that part of Tripoli the value of the pound, the goodnesse of it, and the places of the vent. But it is said that from that hyll there passeth yerely of that commodity fifteen moiles laden, and that those regions notwithstanding lacke sufficiently of that commodity." The author goes on to say that its reputed introduction to Saffron Walden was by the agency of a pilgrim, who stole a "head" of Saffron, and hid it in a hollow place in his Palmer's staff which he had purposely prepared.

There is no evidence of the acquaintance of the ancient Egyptians with Saffron either as a drug or as a cultivated plant. In the medical *Papyrus* published by Ebers a word occurs, Matet, several times shewn by the to be a plant. Stern in his *Glossary* renders it by the Coptic word **ⲘⲈⲐⲀⲒⲞ.** which modern lexicographers have erroneously rendered "Crocus hortensis," or Saffron; instead of *Safflower*, or Carthamus, which was used in ancient Egypt.

The following stories of Saffron in Egypt were probably invented to bear out the untenable derivation by some Greek lexicographers of κροκόδειλος from κρόκος and δειλός.

"The soverign power of genuine Saffron is plainly proved by the antipathy of the crocodile thereunto; for the crocodile's tears are never true save when he is forced where Saffron groweth, whence he hath his name of κροκόδειλος, or the Saffron-fearer, knowing himself to be all poison and it all antidote." Thos. Fuller, *Worthies of England*, about 1661, Vol. I, p. 336; reprint of 1811.

"For which cause those among the Egyptians that had the charge to look to the bees in their gardens were wont to smear their bee-hive with Saffron, which as soon as the crocodile perceived, he would presently run away." Tom Coryat's *Crudities, hastily gobbled up in five moncths travells*, &c., 1611, p. 182.

China. Reference is made to the cultivation of Saffron in China in Yale's *Marco Polo*, Vol. II. Chapter 80, p. 179-180.

*See appendix.

Monsieur P. Chappellier, in his paper "*Sur l'origine du Crocus sativus*, Linn. (*Saffran Officinal*)," read before the Botanical Society of France, on the 15th. of May, 1873 (*Bulletin de la Société*, Tome XX, p. 191), states on the authority of M. Eugène Simon, French Consul at Ningpo, that *Crocus sativus* is extensively cultivated in China; and that he obtained through M. Simon's agency a quantity of the corms for distribution to the cultivators of the Gâtenais. He further states that the Saffron plant was introduced into China at the time of the Tartar Invasion.

M. Simon also refers to the cultivation of Saffron in China in *La Journal de la Société d' Acclimation de Paris* of November, 1869, but does not state in what part of the Empire.

I am indebted to Mr. W. R. Carles, Her Majesty's Consul at Shanghai, for the following information obtained from Dr. Butschneider, Physician to the Russian Legation at Pekin:—

"The Bastard Saffron (*Carthamus tinctorius*) is extensively cultivated all over the Chinese Empire; but I have never heard of the cultivation of Saffron (*C. sativus*) in China, although the article is well known in the country, and much used in medicine, and for dyeing purposes. In Pekin the Saffron sold in apothecary shops is called Si tsang hung hua, or Safflower of Tibet. Some years ago I was informed by a Tibetan Lama that this plant is not grown in Tibet, but that all Saffron imported into China, through Tibet, comes from Balta and Khalchi. I do not know what places are meant; the second may perhaps be Khache in Nepal.

"The well-known Chinese Materia Medica 本草 Pun tsaou, composed between 1552 and 1578, is the only Chinese work noticing the Saffron. Li Shi chen, the author of it, after having treated of the hung hua, or *Carthamus tinctorius*, XV: fol. 42, speaks of the Saffron, which he terms Fan hung hua, (Foreign Saffron) or Si fa lang; also tsa fa lan. Without doubt by these names the Persian Záferàn is rendered. The plant is said to grow in Si fau (Tibet), in the country of the Mohammedans, and in Tien fang, (Arabia.)

"At the time of the Mogul Dynasty (A.D. 1250-1368) they began in China it seems to mix it with their food. In Persia up to the present time the people mix their rice with Saffron." Mr. Carles adds: "It is perhaps worth mentioning, that in Shanghai, Saffron is called after Szechuen, the province from which it is said to be imported; but it is more probable that the Szechuen traders obtain it from Tibet."

India. The following is an account, somewhat abridged, of the Saffron Crocus of Kashmir. The account was kindly prepared for me by Dr. Downes, Medical missionary

residing at Kashmir, at the request of Mr. Isaac Anderson Henry, of Edinburgh.

"The famous Saffron fields of Kashmir are situated in the vicinity of Pampur, eight miles from Srinagar, up the river Jhelam on its north bank between the hills and the river; the plain on which the Saffron grows is about fifty feet from the valley. In dry seasons, the produce averages nearly a ton; though the crop was in 1871 only half that amount, viz: 1380 Traks, and of this quantity, 690 Traks were taken by the Government. From six to eight annas, or from ninepence to one shilling is given for a Tola weight of 180 grains (equivalent to about thirty-five shillings per pound). Saffron is used as a frequent condiment, and as a medicine. The Mussulmans of the valley are generally unable to buy it. The stain on the forehead of a Hindu Pundit is partially formed of Saffron. Some 1600 lbs. are exported yearly from Kashmir to Laddahk (Ladakh)."

"The soil of the Pampur plains is said to be a light ferruginous clay, dug up near the River Jhelam, and conveyed at great labour to the Saffron fields. The bulbs are planted in June, on raised parterres, to insure drainage; and the Saffron is collected in October. It is grown in four places in the Valley of Kashmir, called Karewas, *i.e.* flat pieces of table-land; they are from fifty to one hundred and fifty feet above the river, bare of trees, and little if at all irrigated. The Kashmir Valley is five thousand two hundred feet above the sea-level. Some of the people of the city have also grown the Saffron in their gardens, and obtained an abundant produce. The people have a tradition that some holy man prayed, and in answer to his prayers the Saffron Crocus sprang up near a well; others, more sceptical, assert that it was brought from the direction of Kabul by a ruler of Kashmir, named Bor-sháh."

The cultivation of Saffron is being commenced in Alwar.

Its cultivation in Kashmir is noticed in J. L. Stewart's *Punjab Plants*, p. 239, (Lahore, 1869,) from which I condense the following.—Vernacular Kongs. Kesar.—The cultivation is limited to one small tract at Pampur. The corms are planted in June. The crop is not irrigated, being liable to injury by moisture. When the corms have got old, after ten or twelve years, they are dug up, and the smaller ones re-planted on fresh ground. The Saffron is collected in October, and is exported both to the north and south from Kashmír. It goes mostly to Yarkand, and in 1867 five and a half maunds reached Lé. It is also imported into India from Persia *via* Afghanistan and the Bolan Pass.

In Dr. Thomson's *Travels in Western Himalaya and Thibet*, pp. 288 and 455, reference is made to the cultivation of Saffron, both at Avantipura, and at Pampur in Kashmir. And it is also referred to in Elmslie's *Kashmiri Vocabulary*, pp. 159-160 (London, 1872).

Royle's plate of *C. cashmerianus* (identical with *C. sativus*), *Illust. Bot. Himal.*

90, was from a drawing made in the Sharanpur Botanic Garden, the plant having been obtained from the Valley of Kashmir in 1826.

I am indebted to Mr. Isaac Anderson Henry for some corms obtained from Ladak, in Little Tibet; the flowers from which differ in no respect from those of the Saffron Crocus of Europe.

Asia Minor. The following references from classical authors are sufficient to shew how widely Saffron was recognised in ancient times as a product of Cilicia. "Cilician," or "Corycian," were the established classical designations when speaking of Saffron; and it seems that the Saffron Crocus growing in Cilicia went by the poetical phrase of "Spica Cilissa."

Strabo the geographer, who wrote during the reign of Augustus, in his description of Cilicia (xiv. 5 § 5), tells us that the best Saffron (κρόκος) grew there in the so-called Corycian "Cave," near the town of Corycus (Κώρυκος), now called Korghoz. He describes this "cave" as a circular hollow sheltered by surrounding cliffs. Much of it stony and full of bush, with Crocus-bearing ground scattered here and there.

Victor Hehn, in his *Kulturpflanzen*, p. 277, goes so far as to suppose that Κώρυκος itself took its name from the Crocus grown there. He says that the old Hebrew form of the word κρόκος was Karkom. In other Semitic dialects *e.g.* in the tongue of the Cilicians, the word may have had a different meaning but still a similar sound, and so gave its name to the place; but this of course is only a speculation.

Mr. Redhouse on the other hand suggests that the name of the place, Κώρυκος may be very ancient and may have been transferred to the drug. He argues that the Phœnicians may have first learnt the use of Saffron from the Hittite or the early inhabitants of Corycus, and naturally calling it the Corycian drug, they spread its name east and west.

Pliny 21. 6. (17) tells us that the best Saffron was that which came from Cilicia especially from the Corycian mountain, and Sallust, Hist. ii. 23, "Iter vertit ad corycum urbem, inclutam speci atque nemore in quo crocus gignitur."

Cowley, in *A. Coulcii Plantarum*, 1661, lib. i. 40, quotes—

> Corycii pressura croci. Lucan. (*Pharsalia* Lib. ix, 809.)

and adds the note "Omnes poetæ hoc quasi solenni quodam epitheto utuntur. Corycus nomen urbis et montis in Ciliciâ, ubi laudatissimus crocus nascebatur."

> Terque lavet nostras spica Cilissa comas. *Prop.* IV (V) 6, 74.
> Et sonet accensis spica Cilissa focis? *Ov.* F. 1. 76.
> Et hic Cilici crocus editus antro. Verg? *Culex*, 400.
> Et cum scena croco Cilici perfusa recens est. *Lucretius* II. 416.

Spenser wrote of it as

"Saffron sought for in Cilician soyle";

and Brown, as

"Saffron confected in Cilicia." *Brit. Past.* 1, 2.

These references are probably derived from Pliny.

According to Chappellier, Saffron has given its name to Zafaranboli "Ville située près Inobole (? Inebole or Boli) en Anatolie au sud-est de l' anciene Héraclée."

Persia has long been celebrated for its Saffron; Royle states that it has been cultivated there as an article for export. Meyer's *Geschichte der Botanik*, Vol. III, p. 283, contains references to its cultivation there in the early middle ages, collected from the *Book of Lands* of the Persian Abu Ishag Alfarsi noticing the places in Persia, where Saffron was grown. It was also anciently cultivated at Holwān in the Territory of Babylon and in the vicinity of Aleppo.

It is largely cultivated in many parts of Europe:—in France, in the arrondissement of Pithiviers; in the Gâtinais Seine-et-Marne, Beaumont and Puiseaux; also in the Department of Vaucluse, especially around Carpentras.

In the early part of the seventeenth century it was cultivated in sufficient quantities in Zeeland to render its importation from England unnecessary.

The cultivation of Saffron in Spain by the Saracens in the middle ages is referred to in the *Book of Agriculture* by Jbn el Awwâm (CXXII, § 4, Arabic text and Spanish Translation by Banqueri, Madrid, 1802. French Translation by Clement Mullet, Paris, 1864), who gives directions for its culture in a reference to the Nabathean writings on agriculture.

In Spain it is still grown in the Provinces of Aragon, New Castile, and Murcia, and in the district of la Mancha.

Saffron is cultivated in some parts of Austria; and it is reputed that one Stephen von Hausen, a native of Nuremberg, who accompanied the Imperial Ambassador to Constantinople about the year 1579, brought the first bulbs to Vienna from the neighbourhood of Belgrade. It is naturalized as the remnant of ancient cultivation in the vineyards, and dry grassy places at Ozlar (or Orlar) near Botzen, in the Tyrol, and is said to have given its name to Zaffarano, a village in Sicily, near Mount Etna. It has long been grown in the Abruzzi, and Holinshed (*Chronicles of England*, Book III, Chap. 8), in the sixteenth century referred to Aquila as being then the greatest mart for Saffron there. The following particulars of its present culture are derived from a Paper read by Mr. H. Groves, of Florence, at the Pharmaceutical Conference at Bristol.

The culture has been carried on for many generations on the lower spurs of the Appenines, at a height of from two to three thousand feet, on stony, calcareous ground below the horizon of the Beech. Here the stones are picked off, the ground well trenched to the depth of half a mètre, and prepared in August with animal manure, preferably that of the sheep. The corms are planted on ridges, with intervening furrows, which for economy of ground are sown with corn. As the corn crop is gathered before the Saffron flowers appear, the furrows remain free as pathways for the gatherers, and are so disposed as to drain the plot. The crop of Saffron is gathered in the latter part of October, and through November. Women pluck the flowers in the early morning, and remove the stigmata at their leisure. Several flowers are usually produced by each corm,—in some instances as many as twelve. Once planted, the Saffron plots remain undisturbed for two years, when they are dug up and planted with corn in the third year, after which they may be again used for Saffron, although the cultivators seek to keep the plots shifting as much as possible.

Many of the wealthier landowners owe their prosperity to Saffron dealing, which is speculative, as the price per kilo ranges from one to three hundred lire. The poorer cultivators sell at the price of the year; but the richer dealers set aside their Saffron in tins if the price does not suit them. Some seasons have yielded such profits, that one year's harvest has surpassed the value of the land under cultivation. At other seasons the cultivation would have ceased, were not the beds of two years duration, and consequently no expense was entailed in waiting for the result of a second season.

The adulteration of Saffron is carried out in various ways, the chief mode being by mixing with it boiled and shredded beef; the shreds being stained with Saffron water, and afterwards dried. The filaments of the stamens are also dyed in the same manner, and intermixed. Another adulterant is an almost impalpable yellow earth, found occasionally in the mountains. Finally, before taking the product to market, it is damped with wine or water.

The Aquilan or Abruzzi Saffron commands a higher price than any other kind, not excepting that of Spain.

*English Saffron.**—That Saffron as a drug has been well known in England for many centuries, is proved by the frequent references to it by early writers; but the date of its earliest appearance as a cultivated plant in England is not quite clear.

Saffron is mentioned several times in Anglo-Saxon leech-books, *e.g.* "when he

* For much of the information on English Saffron, I am indebted to the Rev. Canon Ellacombe; some of my paragraphs being copied with little alteration from the chapter on Saffron in his *Plant-lore of Shakespeare:* Mr. Ellacombe has also hunted up for me many references to Saffron in old books.

bathes let him smear himself with oil mingle it with Saffron".—Tenth Century leech-book ii, 37—"For dimness of eyes, thus one must heal it; take Celendine one spoonful, and aloes, and Crocus (Saffron in French)".—Schools of Medicine; tenth century, c. 22. In these instances it may be only the imported drug, but the name occurs also in an early English Vocabulary among the *Nomina herbarium* (*i.e.* names of herbs)—"Hic Crocus A^{e} Safurroun;" and in a pictorial vocabulary of the fourteenth century—"Hic Crocus An^{ce} Safryn. From this it may be assumed that the plant was probably cultivated in England at that time.

I select the following from among many other early references to Saffron by English writers.

In the *Lber Albus* (1419), an old London document published in the Rolls series, there is a list of duties paid upon articles of import, in which the local dues on Saffron are referred to.

In Tusser's *Five hundred pointes of Good Husbandrie* (1575), we find under *August Husbandry:*

3. "Pare Saffron betweene the two S. Maries daies,
or set or go shift it, that knowest the waies.
what yeere shall I doo it (more profit to yeeld?)
the fourth in Garden, the third in the feeld.

4. In having but fortie foote workmanly dight,
take Saffron ynough for a Lord and a Knight.
all winter alter [after] as practice doth teach
what plot hane ye better for linnen to bleach."*

* "Saffron makes a very good sward whereon linnen may lye hollow, and bleach well enough."

And under *August Abstract:*—

3. Pare Saffron Plot
forget it not
His dwelling made trim
looke shortly for him
when harvest is gon
then Saffron comes on

4. A little of ground
brings Saffron a pound
the pleasure is fine
the profit is thine
kéepe colour in drieng
well used worth buieng.

Raphael Holinshed, who was Tusser's contemporary, gives in his *Chronicles of England*, Book iii. chap. 8, a very full account of Saffron culture in England in

the sixteenth century. The following is a condensed summary. He commences by extolling the quality of English Saffron grown about Saffron Walden, (sometimes called Waldenburg,) where it was first planted in the reign of Edward the Third. It was also grown in Gloucestershire and those western parts. The cultivators of Saffron are spoken of as *Crokers*.

"The heads (corms) of Saffron are raised in Julie, either with plough raising, or lined hooke, and being severed from their rosse or filth, and severed from such heads as are engendered of them sinc the last setting, they are interred again in Julie and August by ranks or rowes, and being covered with moulds they rest in the earth, where they cast forth little fillets and small roots like unto a scallion untill September, in the beginning of which moneth the ground is pared, and all the weeds and grasse that growith upon the same removed to the intent that nothing may annoie the floure when as his time dooth come to rise. These things being thus ordered in the latter end of the aforesaid moneth of September, the floure beginneth to appeare of a whitish blew, and hath in the middest thereof three chives verie red and pleasant to behold."

"These floures are gathered in the morning before the rising of the sonne, and the chives being gathered from the floures, are dried upon little killes covered with streened canvasses upon the fire: whereby and by the weight that is laid upon them, they are dried and pressed into cakes. In good yeeres we gather four score or an hundred of wet Saffron of an acre which being dried dooth yeeld twentie pounds of drie and more. The price of Saffron is commonlie about twentie shillings in monie or not so little, it is easie to see what benefit is reaped by an acre of this commodotie towards the charges of the seller, which indeed are great, but yet not so great as he shall be thereby a looser if he be anie thing diligent. For admit that the triple tillage of an acre dooth cost thirteen shillings four pence before the Saffron be set, the clodding sixteen pence, the taking of every load of stones from the same four pence, the raising of every quater of heads six pence and so much for cleansing them, besides the rent of ten shillings for everie acre thirtie load of doong which is worth sixpence the load to be laid on the first yeare, for the setting three and twentie shillings and foure pence, for the paring five shillings, sixpence for the picking of a pound wet &c. Yea though he hire it readie set and paie ten pounds for the same, yet shall he sustain no damage, if warm weather and open season doo happen at the gathering."

"This also is to be noted that everie acre asketh twentie quarters of heads placed in ranks two inches one from another in long beds which conteine eight or ten foot in breadth, and after three yeeres that ground will serve well, and without compost for barlie by the space of eighteene or twentie yeeres together. The heads also of everie acre at the raising will store an acre and a halfe of

new ground which is a great advantage and it will floure eight or ten daies together, but the best Saffron is gathered at the first at which time four pounds of wet Saffron will go verie neere to make one of drie; but in the middest of five pounds of the one will make but one of the other because the chive waneth smaller, as six at the last will do no more but yeild one of the dried, by reason of the chive which is now verie leane and hungrie, after twentie yeeres also the same ground may be set with Saffron againe, and in lieu of a conclusion take this for a perpetual rule, that heads comming out of a good ground will prosper best in a lighter soile; contrariwise: which is one note that our Crokers do carfulie observe."

The author goes on to state that the corms are taken up every third year, after midsummer. The first years crop is the smallest though producing the best quality of Saffron. In the third year the corms throw off from three to six other "headlets" or young corms, and from the rapid increase the young corms are worth but from five shillings and two-pence to ten shillings a quarter of eight bushels.

In Norfolk and Suffolk the corms are taken up but once in seven years though the quality of the Saffron is not so good as that of Essex. "Such also was the plentie of Saffron about twentie yeeres passed that some of the townsmen of Walden gave the one halfe of the floures for picking of the other, whilest the rest not thankful for the abundance of God's blessing bestowed upon them (as wishing more scarsitie thereof because of the keeping up of the price) in most contemptuous manner murmured against him, saieng that he did slite Saffron wherewith to choke the market. But as they showed themselves no lesse than ingrat infidels in this behahlfe, so the Lord considered their unthankfulnesse and gave them ever since scarsitie as the greatest murmurers have now the least store, and most of them are either worne out of occupieng or remain scarce able to mainteine their grounds without the help of other men. But to proceed, when the heads be raised and taken up they will remaine sixteen or twenty days out of the earth and are planted again by St. James-tide or verie shortlie after."

"The Crokers or Saffron men do use an observation a litle before the coming up of the fleure and sometime in the taking up at Midsummer tide by opening of the heads to judge of plentie or of scarsitie of this commoditie to come, for if as they see as it were manie small harie veines of Saffron to be in the midst of the bulbe they promise a fruitfull yeare."

The adulteration of Saffron with candle-grease and butter is next referred to, and these details are followed by particulars respecting its multitudinous medicinal uses. "Therefore our Saffron (besides the manifold use that that it hath in the kitchen and pastrie, also in our cakes at bridals and thanksgivings of women) is very profitably mingled with those medicines which we take."

No definite information exists as to the date of the introduction of the Saffron

plant into England. The usual statement, made by one writer after another, is that it was introduced by Sir Thomas Smith, in the time of Edward the Third, in the year 1444, and the curious account given by Hakluyt, (*English Voiages*, &c., vol. 2, 1582) is worth extracting. "It is reported at Saffron Walden that a pilgrim proposing to do good in his countrey stole a head (corm) of Saffron, and hid the same in his palmer's staffe which he had made hollow before of purpose, and so he brought the root into this realme, with venture of his life, for if he had bene taken by the law of the countrey from whence it came he had died for the fact."

It is clear from this, that at the time of Hakluyt—1582—Saffron was a staple English product, and its importance is shewn that it gave the name to Saffron Walden, as well as to Saffron Hill in London, which "was formerly a part of Ely Gardens, and derives its name from the crops of Saffron which it bore".—Cunningham.

Coles, in his *Adam in Eden* (1657), attributes its introduction to the Romans. There is abundant authority from Tusser, Gerard, Parkinson, Camden, and other writers, that it was largely cultivated before and after Shakespeare's time, and that the quality of English Saffron was very superior. "Our English honey and Saffron is better than any that cometh from any strange or foreign land".—Bullein *Government of Health*, 1588. Shakespeare, in *The Tempest*, *Comedy of Errors*, and *All's well that ends well*, uses the word Saffron as a colour, and in *The Winter's Tale*, more specifically as a dye—

> "I must have Saffron to colour the Warden Pies."
>
> *Winter's Tale*, Act IV. Sc. 2.

Saffron is reputed to have been grown at Hinton, in Cambridgeshire; and according to Hakluyt, it appears to have been cultivated in Cambridgeshire before his time. Miller, in his *Gardeners' Dictionary*, published in 1733, gives a long account of the method of its cultivation and use, as practised at Saffron Walden, and in Cambridgeshire, in the years 1723-28. Loudon's *Encyclopædia of Plants*, under *Crocus* describes its history, use, and culture; and Lord Braybrooke's *History of Audley End*, Essex, may also be referred to for the history of Saffron.

Its importance as a product of Saffron Walden, is indicated by the fact that the Arms of the Boro' are "Three Saffron flowers walled in"; and the Town Records shew that it was an article of culture in the reign of Charles the Second. Lord Braybrooke, in *The History of Audley End*, states that before the beginning of the last century, the quantity grown at, or near Walden annually decreased, and that by the year 1790 it had entirely disappeared from the neighbourhood. In the *English Botany*, Vol. I, p. 24, Ed. 2, it is stated that Saffron is found

naturalized about Halifax, near Derby, and about Saffron Walden; and "the latter is the only place where the article of the Materia Medica is now (1832) produced for sale in England." It is doubtful however, in the face of Lord Braybrooke's statement, whether the culture of Saffron Walden was of so recent a date. Mr. W. Chater, of the Nurseries, Saffron Walden states that it does not occur there now, even as a naturalized plant.

To modern cultivators of Crocuses who one and all find so much difficulty in getting the Saffron to flower in their gardens, it is more a matter of surprise that Saffron was grown in England as an economic plant for three or four centuries, than that the production of Saffron has entirely died out; and the Saffron Crocus has disappeared in England even as a naturalized plant.

The Stigmata of several wild species of Crocus are collected for Saffron. Canon Tristram, in his *Natural History of the Bible*, states that in Syria the stigmata of the blue sorts (? *C. cancellatus*, var.) are collected by women and children, and dried in the sun or pressed into small tablets, which are sold in the Bazaars.

At Sivas, in Asia Minor, Saffron is obtained from *Crocus ancyrencis*, and called by the Turks, Cheardrin, Saffron, and several other things. In Sicily according to Gussone, the stigmata of the wild *C. longiflorus* are made use of; Mr. C. C. Lacaita tells me that the use of the stigmata of the wild Saffron Crocus (*C. Thomasii*, Tenore) for the flavouring of dishes has come under his own observation in the neighbourhood of Taranto, in South Italy, and I am informed by Mr. Quintana, H. M. V. Consul at Syra, that the stigmata of the wild *C. sativus* var. *Cartwrightinnus* are collected for Saffron on the higher parts of the Island of Andros, and that a pigment is prepared from it, locally known as Zafran.

The method of the preparation of Saffron probably varies in different countries. In some cases, the pistils of the Saffron Crocus are simply dried as they are gathered, as "Hay Saffron," or are pressed in the process of drying into compact cakes.

I condense the following account of the usual mode of preparation from Hooper's *Medical Dictionary*, Ed. 7, pp. 476-477.

The flowers are gathered early in the morning just as they are beginning to open; they are then spread upon a table, and the stigmas, with a portion of the style, are carefully picked out of the flowers, and dried on a portable kiln of peculiar construction. The wet Saffron is spread to a depth of two or three inches on sheets of white paper placed on a hair-cloth stretched over the kiln; it is covered with other sheets of paper, and over all is laid a coarse blanket three or four times doubled, and pressed down with a board and a large weight after the fire is lighted. The first heat is strong, to make the Saffron "sweat"; and after an hour it is turned, and the same degree of heat continued for another hour. The heat is then reduced during a further drying for twenty-four hours, the "cake"

being turned every half hour to dry it thoroughly, when it is fit for the market. The finest quality known as "Hay Saffron" consists of the stigmata loosely dried.

Saffron is regarded as a stimulant and antispasmodic; but from the experiments of Dr. Alexander, its powers in these respects appear to be inconsiderable. In modern practice it is scarcely ever given except as a cordial adjunct to more active remedies. It is extensively used in Pharmacy, in the form of syrup or tincture, as a colouring agent.

The ancient reverence for Saffron as a therapeutic agent, is one of the most remarkable points in the history of a drug which can be traced back for several thousand years, and which has been handed down to our modern Pharmacopœias; inasmuch as the Medical Faculty have ceased to recognise its therapeutic powers.

The almost superstitious regard with which Crocus and Saffron were held in medieval times is shewn by the great mass of literature that exists on the subject. The title of Hertoldt's *Crocologia*, a curious book published at Jena in 1671, may be given as an example:—

Crocologia seu curiosa Croci Regis Vegetabilium enucleatio continens Illius etymologiam, differencias, tempus quo viret, et floret, culturam, collectionem, usum mechanicum, Pharmaceuticum, Chemico-Medicum, omnibus paene humani corporis partibus destinatum additis diversis observationibus et questionibus, CROCUM concernentibus ad Normam et Formam S.R.I. Academiæ Naturæ curiosorum congesta a Dan: Ferdinando Hertodt. Ph. et Med. Doctore, &c. &c. Jenæ. 1671." The book is a duodecimo of nearly three hundred pages, divided into twenty-three Chapters, fourteen of which are devoted to the treatment of specific diseases by Saffron and Crocus.

In the fifteenth and sixteenth centuries the cultivation of Saffron was of so much importance in European husbandry that a reference to it was omitted by no writer on the subject. An account of it is to be found in Crescentio, Serres, Heresbach, Von Hohberg, Florinus, and other writers' works. Indeed Saffron was such an important article of trade, that its adulteration was made the subject of severe penalties in several countries. In the year 1550, Henry II, king of France, issued an order for the express purpose of preventing such frauds.

Gerard's summary of the virtues of Saffron are as follows:—"The moderate use of it is good for the head, and maketh sences more quicke and lively, shaketh off heavy and drowsie sleep, and maketh a man mery."

To its use in confections the following extract from the *Apparatus Plantarum* of Laurembergius (1632) refers:—In re familiari vix ullus est telluris habitatus angulus ubi non sit Croci quotidiana usurpatio aspersi vel incocti cibis." Henry Stephen also says—"Saffron must be put into all Lent soups, sauces, and dishes;

without Saffron we cannot have well cooked peas." *Apologie pour Herodote*, par H. Estiene, 1735.

Probably, however, it is as a dye that Saffron during its long use has mostly commended itself for cultivation, both in ancient and modern times. In early Greek times Saffron dye was a Royal and almost sacred colour, though the Saffron robe at one time in Athens, was used with a less decorous significance (See Becker's *Gallus*, Becker's *Charicles*. Smith's *Dictionary of Antiquities*, and Hehns *Kulturpflanzen* 1st. Edition of 1870).

Saffron was used as a royal dye in old Irish days and in the Hebrides at a much later period. The Lein-croich or Saffron dyed shirt or mantle was worn by persons of rank in the Western Isles down to the seventeenth century (M. Martin, *A description of the Western Islands of Scotland*, 2nd. Edition, 1716).

Its use in medicine is now almost limited to its employment as a colouring agent. In China it is said to be much used for dyeing yellow; and at the time of the Mogul Dynasty (A.D. 1250-1368) the Chinese began to mix it with their food. It is largely used in the present day in India, and to a less extent in Italy and Spain. In Persia, too, up to the present time a similar use is made of it. Its penetrating powers as a dye and even as an odour were proverbial. Luther's *Fourth Sermon* (1548) will supply an instance:—

"As the Saffron bag that hath bene ful of Saffron, or hath had Saffron in it, doth ever after savour and smel of the swete Saffron that it contayneth; so our blessed Ladye conceived and bare Christe in her wombe, dyd ever after resemble the manners and virtues of that precious babe which she bare."

In ancient times Saffron seems to have stood in high repute as a perfume; it is probable that the passage in the *Canticles* IV. 14, refers to it as such; and Newton, at p. 193 of his *Herball to the Bible* (1587), says, "Saffron is mentioned among other odiferous and sweete herbs in the Garden and Orchards of the Spouse, in the *Canticles;* so that for the greater fragrance they bound up together (as it were into one nosegay) Camphire, Spikenard, Saffron, Calamus, Cynamon, with al the soote trees and herbs in Lebanon of Incense, Myrrhe, Aloes, and sweete spices."

I condense the following from Beckmann's *History of Inventions* (Vol. I. p. 176). Not only were halls, theatres, and courts strewn with the plant to give an agreeable smell, but it entered into the composition of many spirituous extracts which retained the same scent; and these costly smelling waters were made to flow in small streams from the limbs of a statue. From Saffron, with the addition of wax and other ingredients, the Greeks also prepared scented salves; of the method of preparing these, mentioned by Athenæus, Cicero, and others, an account is to be found in *Dioscorides*, Lib. 1. C. 26.

Suetonius, in *Nero*, Cap. XXV, refers to the sprinkling of the streets of Rome with Saffron, on Nero's return from Greece.

Such uses of Saffron are referred to in the following passages:—

> Pulpita sollemnes non oluere crocos. *Prop.* IV. I. 16.
> Et crocino nares murreus ungat onyx. *Prop.* III. viii. 22.
> Hoc rogo, non melius, quam rubro pulpita nimbo
> Spargere et effuso permaduisse croco? *Mart.* V. 26. 8.

Scheller in his Latin Dictionary says that the Romans used to mix the Crocus (? Saffron) with wine, with which they sprinkled the theatres and other places to give them an agreeable scent; and Lord Lytton, in *The Last Days of Pompeii*, refers to its use in the Roman Baths:—

> "She (Nydia) pays for the baths, but does not waste the Saffron."

Hertoldt, in his *Crocologia* above referred to, states that the Lacedemonians used Saffron for dyeing the hair by repeated washings, and the passage in *Lucretius* ii, 416—"et cum scena croco Cilici profusa recens est" probably referred to some liquid preparation of Saffron as described in Pliny, Lib. XXI, cap 6. 17, 883.

Randal Cotgrave's *Dictionary* renders the word Saffrané, as seasoned or coloured with Saffron; and Saffranier, as a seller of Saffron; indicating that Saffron was then (1611) much more commonly used than now. Nare's *Glossary* has the following: "To Saffron"; to stain of a yellow or Saffron colour; a term used by Drayton in the early edition of his *Eclogues* (1593 4to.)

> The lothlie morphew saffroned the place.
> *Sign:* B. 36.

In *Wits Recreations* (1654) occurs:—

> Give us bacon, rinds of wallnuts,
> Shelles of cockles, and of small nuts,
> Ribands, bells, and saffrand linen.

One of the uses to which Saffron was applied in the middle ages, was for the manufacture of the beautiful gold colour used in the illumination of missals, etc., when the actual gold was not used. This is the receipt from the work of Theophilus in the eleventh century:—"If ye wish to decorate your work in some manner, take tin pure and finely scraped, smelt it and wash it like gold, and apply it with the same glue upon letters or other places which you wish to ornament with gold or silver; and when you have polished it with a tooth, take

Saffron with which silk is coloured, moistening it with clear of egg without water and when it has stood a night, on the following day cover with a pencil the places you wish to gild, the rest holding the place of silver." Book I. C. 23, Hendrie's Translation.

In connection with the subject of the dyeing and colouring powers of Saffron, the following analysis of the Saffron of commerce may be of interest.

According to Aschoff's analysis Saffron consists of

Volatile oil	1.4 per cent.
Wax	4.0 "
Polychlorite (Saffranine)	52.0 "
Gums	10.4 "
Fibre	19.0 "
Balsamic matter	2.0 "
Water	10·0 "
	98.8

Analysis by Bouillon-Lagrange and Vogel—

Volatile oil, including Stearoptine	7.5 per cent.
Wax	0.5 "
Saffranine (Polychlorite)	65,0 "
Gum	6.5 "
Fibre	10,0 "
Albumen	0.5 "
Water	10.0 "
	100.0

So that the actual colouring matter forms more than half the weight of good commercial Saffron.

Rochleder (T. pr. Chem. LXXIV. 1) regards it as being identical with the colouring matter of the pods of Gardenia grandiflora.

Lindley (Veg. King. p. 160) states that polychlorite possesses the properties of being totally destroyed by the action of the solar rays; of colouring in small quantity a large body of water; and of forming blue and green tints when treated with sulphuric and nitric acids, or with sulphate of iron.

Saffron when burnt left 8.9 per cent of ash containing Potash, Soda, Lime, Magnesia, and Chlorine; and Phosphoric, Silicic, and Carbonic acids.

Perera states that one grain of good Saffron contains the Stigmata of nine flowers, so that one ounce would represent the produce of four thousand three hundred and twenty flowers.

Monsieur P. Chappellier of Paris, has been experimenting on the increased

production of Saffron by the cultivation of a monstrous form of Crocus sativus, represented on Plate D, Fig. 1, in which the segments (*d.d.d.*) are developed as stigmata. M. Chappellier's experiments are described in a paper by M. Duchatre, in *Le Journal de la Société Centrale d' Horticulture de France*, 3rd. Série, I, p. 171-180, 1879.

THE GENUS CROCUS.

ORDER IRIDEÆ. Tribe Sisyrinchieæ

Of Bentham and Hooker's *Genera Plantarum*, vol. iii, p. 693.

POSITION.

FERRARIA—HOMERIA—HEXAGLOTTIS—CROCUS—SYRINGODEA—GALAXIA—ROMULEA.

Crocus, *Linn. Gen. n.* 55.

Crocus, in part, *Schur, Sert. Pl. Transs.*

Crociris, in part, *Schur, Sert. Pl. Transs.* 73, and *Enum. Pl. Transs.* 653.

Perianthium infundibuliforme, tubo longo tenui superne in faucem ampliato; lobi æquales, erecto-patentes. Stamina fauci affixa, perianthio breviora, filamentis brevibus liberis; antheræ erectæ, lineares, filamento longiores, basi sæpius breviter sagittatæ, inter lobos basifixæ. Ovarium oblongum, 3-loculare, loculis ∞-ovulatis; stylus filiformis, elongatus, ramis lineari-cuneatis apice sæpius dentatis lobatis v. multifidis, extremitate sola stigmatosis. Capsula oblonga, membranacea, loculicide 3-valvis. Semina subglobosa, testa carnosula; albumen carnosum v. subcorneum.—Cormi tunicæ membranaceæ fibrosæ v. reticulatæ. Folia radicalia, longe linearia, non disticha, basi vaginis scariosis cincta. Caulis intra folia sub folio florali non evolutus. Folium florale (*spatha basalis* dictum) dum adsit, in cormo sessile, vagina longa, undique hyalino-scariosum, pedunculos radicales seu scapos 1- ∞ basi involvens, in speciebus nonnullis deest, in aliis adsunt 2-3. Spatha in pedunculo seu scapo terminalis, membranacea, ovarium involvens. Flos in spatha unicus, sessilis; adest etiam sæpe intra spatham bractea angusta hyalino-scariosa.—(Benth. & Hook. *Gen. Plant.*)

DIVISION I.—INVOLUCRATI.

Species with a basal spathe springing from the base of the scape.

Section I.—FIBRO-MEMBRANACEI.

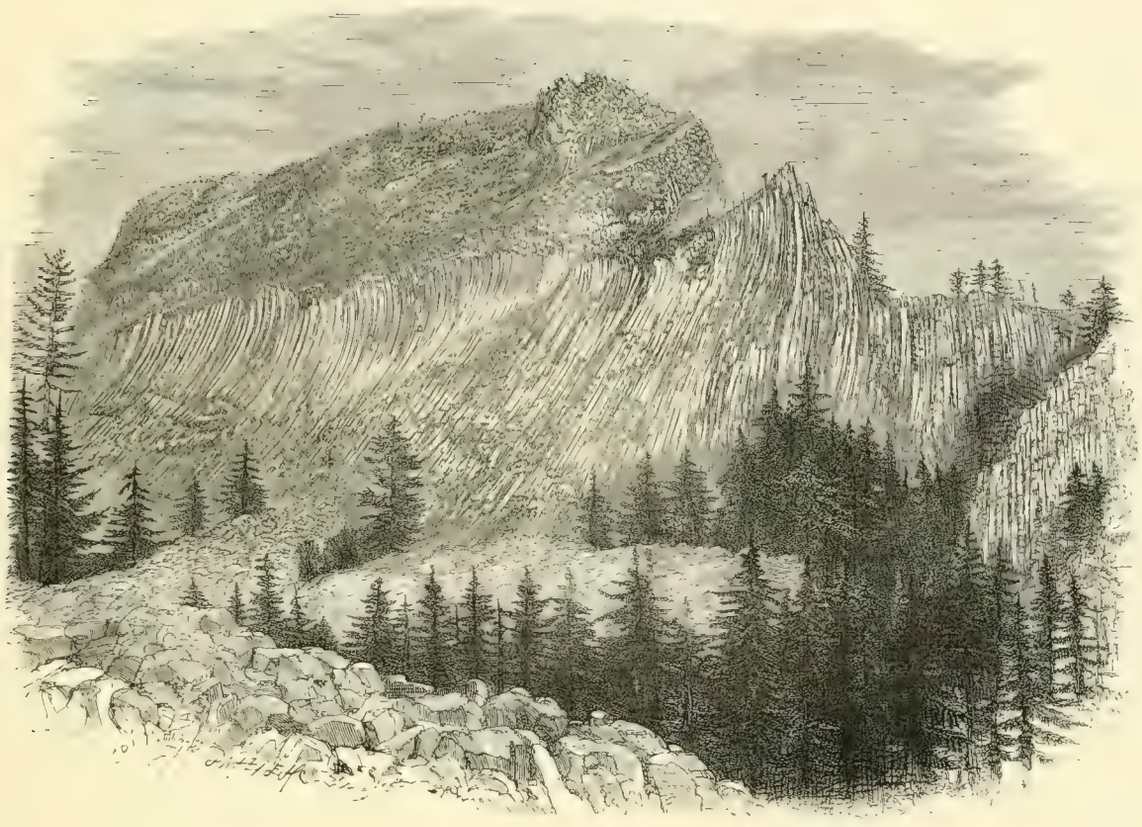
Corm tunic of membranous tissue, or of membranous tissue interspersed with nearly parallel fibres.

Autumn Flowering.—

1. C. iridiflorus.
2. vallicola.
3. Scharojani.
4. zonatus.
5. karduchorum.
6. nudiflorus.
6*b*. granatensis.
7. asturicus.
8. serotinus.
9. Salzmanni.
10. Clusii.
11. ochroleucus.
12. lazicus.
13. Cambessedesii.

Spring Flowering.—

14. Imperati.
15. suaveolens.
16. versicolor.
18. Malyi.
19. minimus.
(20. Boissieri.)



Verespalak Transylvania.

1. CROCUS IRIDIFLORUS.

Section: Involucrati; Reticulati *(Herbert)*: Schizostigma; autumnal *(Baker)*.

Crocus iridiflorus, Heuffel, in Werk. Zoolog.-Bot. Gesell. p. 206; in Oesterr. Bot. Wochen. 1857, p. 222; and in Banat. p. 170; Reichb. Ic. Fl. Germ., vol. ix, Tab. ccclxi, f. 802-3, p. 10; Griseb. and Schur, Iter Hung. in Wiegm. p. 356; Andrä in Bot. Zeit. 1856, p. 68; Klatt, Revis. Irid. in Linnæa, xxxiv, p. 689; Schur, Fl. Transs. 2468, p. 653; G. Maw, Synops. Genus Crocus in Gard. Chron. vol. xvi, New Series, p. 148; Hist. of Crocus in Journ. Linn. Soc., Bot., vol. xix, p. 272; and in The Garden, vol. xxi, No. 532, p. 66.

C. byzantinus, Ker, in Bot. Mag. Sub tab. 1111; Irid. Gen. p. 78; Herbert in Bot. Reg., vol. xxxi, tab. 37, fig. 2; and vol. xxxiii, tab. 4, fig. 5; Hist. Crocus, p. 23, Sp. 22, from Journ. Hort. Soc., vol. ii, p. 269; and drawing in Lindl. Libr. R. Hort. Soc. Lond.; Tchihatcheff, Asie. Min., Part iii, Bot., vol. ii, p. 524, (error as to habitat); Baker, Rev. Sp. Crocus in Gard. Chron., New Series, 1873, p. 1633; List of Crocuses in Journ. R. Hort. Soc., New Series, vol. iv, 1877; and Syst. Iridac. in Journ. Linn. Soc., Bot., xvi, p. 85; J. D. Hooker in Bot. Mag. 1875, Tab. 6141; G. Maw in The Garden, vol. xvi, p. 364, tab. cliii, fig. 8.

C. byzantinus argenteus, Parkinson, Parad., p. 168, tab. 169, fig 3.

C. banaticus, (not of Heuffel), Gay in Féruss. Bull. Sc. Nat. xxv, p. 320 (220); and drawing Bibl. J. D. Hooker; Körnicke in Flora 1836, 2, p. 473.

C. speciosus, (not of M. Bieb), Rochel, Plant. Banat. 5; Reichb., Pl. Crit. x, tab. 948, fig. 1276-7-8; Ic Bot. Cent 10; Bong. En. N. 116; Griseb., Fl. Rumel. 2, 374.

C. nudiflorus, (not of Smith), Kit. in Schultes Œstre. Fl. 1, p. 101.

C. Herbertianus, Körnicke, in Walp. Ann., vol. vi, p. 51.

? Crocum montanum, Clus. Hist., vol. 1, p. 208, 209.

Crociris iridiflora, Schur, Sert. Pl. Transs. p. 73. Enum. Pl. Transs. 653.

Cormus parvus oblatus. Tunica fibro-membranacea sub-reticulata. Vaginæ quam spatha breviores. Folia glabra $\frac{3}{8}$ poll. (0.010 metr.) lata, quam illa specierum aliarum latiora. Spatha monophylla foliacea. Perianthium: faux haud barbata; segmenta exteriora insigne purpurea quam interiora multo majora, interiora pallide lilacina. Anthera aurantiaca, quam stigmata breviora; filamentum lilacinum. Stigmata multifida, purpurea. Semina fusco-rubra, papillosa.

Corm oblate, in cultivation about three-quarters of an inch (0.020 metre) broad and three-eighths of an inch (0.010 metre) high, producing points of growth from various parts of its surface. *Tunic* of thin membrane interspersed with fine sub-parallel fibres reticulated towards the summit. *Cap* membranous, interspersed with distinctly reticulated fibres, produced into short points at the summit. *Basal Tunic* of radiating thin fibres on a membranous base.

Sheathing Leaves about five, from half an inch (0.013 metre) to two and a half inches (0.063 metre) long, foliaceous towards their extremity, and falling short of the proper spathe.

Proper Leaves two or three, dormant within the sheathing leaves at the flowering time, produced in the spring to a foot (0.300 metre) in length, three-eighths of an inch (0.010 metre) broad, broader than in any other species, glabrous, keel narrow, prominent, concave, bounded by sharp lateral ridges, under side of blade glaucous. Lateral channels wide and open.

Basal Spathe an inch and a half (0.038 metre) long. *Proper Spathe* monophyllous four inches (0.100 metre) long, much exceeding sheathing leaves and reaching within an inch and a half (0.038 metre) of the throat, foliaceous at the extremity.

Perianth: Tube about six inches (0.150 metre) in length, purple towards the throat. *Throat* unbearded, purple. *Outer Segments* rhombic in form, about two inches, (0.050 metre) long and one inch (0.025 metre) broad, clear rich purple, much larger than the *Inner Segments*, which are about an inch (0.025 metre) in length and half an inch (0.013 metre) broad, pale lilac with a few purple lines towards the summit.

Stamens about an inch (0.025 metre) in length. *Anthers* orange, about three-quarters of an inch (0.019 metre) long, three times the length of the white or pale lilac *Filament: Pollen Grains* papillose, orange, about $\frac{1}{330}$ of an inch (0.00008 metre) in diameter.

Pistil much exceeding the stamens, from an inch (0.025 metre) to an inch and a half (0.038 metre) high, the style branching towards the level of the summit of the anthers, and produced into a bunch of capillary branching spreading purple stigmata, which much exceed the anthers.

Scape at the flowering time from an inch (0.025 metre) to an inch and a half (0.038 metre) high; at the fruiting time from two to three inches (0.060 metre) high.

Capsule from three-quarters of an inch (0.019 metre) to an inch in length (0.025 metre).

Seed one-seventh of an inch (0.0036 metre) long, and one-tenth of an inch (0.0025 metre) broad, with a rich red papillose surface, and prominent raphe, chalaza, and caruncle, of the same colour as the body of the seed.

Crocus iridiflorus occupies a limited district bordering on the eastern Carpathians, between 44° 20′ and 48° 10′ north latitude, and 21° 30′ and 24° 0′ east longitude, having a range of about 4° of latitude, and $3\frac{1}{2}$° of longitude, in Hungary, Western Transylvania, the Banat, and Wallachia. It is a lowland plant, growing on chalky alluvium in woods and thickets of the lower hills of the district, below an altitude of two thousand feet, at Teckeseto (Tecsö, Tiacsova?), Huszt, and Bustyahaza in the Marmaros; in the environs of Hermannstadt; at Torda in the Siebenbergen; in the environs of Klausenberg, and on Monte Rika; throughout the county of Krasso, and at Oravicza and Cziklova in the Banat, where Dr. Wierzbicki gathered a pure white variety. The only record of its occurrence on the south side of the eastern Carpathians is at Krajova, in Wallachia.

As a garden plant it was known to Parkinson in the early part of the seventeenth century, and described by him, in his *Paradisus*, as *C. byzantinus argenteus*. Parkinson's name of *byzantinus*, under which it is known to most English cultivators, was adopted by Ker in 1808; but as the name implies an error as to its geographical distribution, I do not hesitate to adopt in preference Heuffel's later name of *iridiflorus*, by which it is known in most continental herbaria, and which is moreover, accurately descriptive of the aspect of the flower. Tchihatcheff seems to have been led into the error of recording it as a native of Asia Minor, through the name applied to the plant by Parkinson and by Ker.

Crocus iridiflorus stands alone amongst the Crocuses; it is the only species with purple stigmata; and the marked difference in the size of the inner and outer segments of the perianth, suggested to Schur its separation as a distinct genus,—*Crociris*.

It is an early autumnal species, flowering from the end of September to the end of October; the leaves remaining dormant within the sheathing leaves till the ensuing spring. It is a highly ornamental plant of robust habit, and easy of cultivation, but it is best grown to advantage under the protection of a cold frame.

The white variety gathered by Dr. Wierzbicki in the neighbourhood of Oravicza and Cziklova, of which I have only seen herbarium specimens, would be a desirable plant to introduce to cultivation.

REFERENCES TO PLATE I.

Fig. 1. Flowering-state, October 20th, actual size.
Fig. 2. With matured leaves and capsule, June 3rd, actual size.
Fig. 3. Inner surface of outer segment, actual size.
Fig. 4. Inner surface of inner segment, actual size.
Fig. 5. Stamens and pistil, magnified two-fold.
Fig. 6. Stigma, magnified six-fold.
Fig. 7. Pollen Grain, magnified one hundred and fifty-fold.
Fig. 8. Diagrammatic dissection of scape, ovary, and spathes, actual size.
Fig. 9. Section of leaf, magnified six-fold.
Fig. 10. Corm tunics, magnified two-fold: *a*, cap; *b*, main tunic.
Fig. 11. Seed, magnified six-fold.

Fig. 1. Octr. 20th

CROCUS IRIDIFLORUS, *Heuffel.*

C. byzantinus, Parkinson.

J. Maw, del

F. Huth, Lith. Edin.

Monastery of Sumila, Stauros near Trebizond.

2. CROCUS VALLICOLA.

Section: Involucrati; membranacei *(Herbert)*: Odontostigma; autumnal *(Baker)*.

Crocus vallicola, Herbert in Bot. Reg. xxxi, misc. p. 7; and vol. xxxiii, tab. 16, fig. 3; Hist. Crocus, sp. i,

p. 8, from Journ. Hort. Soc. Lond. vol. ii, p. 254; Tchihatcheff, Asie Min., Part iii, Bot., vol. ii, p. 521; Klatt, Revis. Irid. in Linnæa, xxxiv, p.p. 688-721; Baker, Rev. Sp. Crocus, in Gard. Chron. 1873, p. 1466; List of Crocuses in Journ. R. Hort. Soc. Lond. new series, vol. iv, and Syst. Iridac. in Journ. Linn. Soc., Bot., vol. xvi, p. 84; G. Maw, Synops. Genus Crocus in Gard. Chron. new series, vol. xvi, p. 148; Hist. Crocus in Journ. Linn. Soc., Bot., vol. xix, p. 272; and in The Garden, vol. xxi, No. 532, p. 66; Boiss., Fl. Orient., vol. v, p. 97.

Var. 1 *lilacinus;* Stauros near Trebizond. G. Maw, Synops. Genus Crocus in Gard. Chron. new series, vol. xvi, p. 148.

Var. 2. *Suwarrowianus;* Erzeroum and Caucasus. *C. Suwarrowianus.* K. Koch in Linnæa, xxi, p. 633; Tchihatcheff, Asie Min. Part iii, Bot., vol. ii, p. 525; G. Maw, Synops. Genus Crocus in Gard. Chron. new series, vol. xvi, p. 148; Boiss. Fl. Orient. vol. v, p. 98; *C. Zohrabii*, G. Maw.

Cormus oblatus, $\frac{1}{2}$ ad $\frac{3}{4}$ poll. (0.013-0.019 metr.) latus, membrana fibrosa tenuissima tectus. Vaginæ quam spatha breviores. Spatha monophylla, foliacea. Perianthium: faux barbata; segmenta pallide lactea, in filis tenuibus terminalibus producta, intus purpureo-venosa, maculis duabus aurantiacis prope faucem. Antheræ et pollen pallide lacteæ. Stylus usque ad apices antherarum fissus. Stigmata brevia subintegra lactea. Semina obscure ochrea.

Corm oblate, from half an inch (0.013 metre) to three-quarters of an inch (0.019 metre) broad, and three-eighths of an inch (0.010 metre) high. *Tunic* of thin delicate membrane interlaced with fine parallel fibres, which are occasionally branched, tending to a reticulated structure upwards. The *Basal Tunic* consisting of very thin radiating fibres intermixed with membrane. The *Cap* produced into short points half an inch high.

Sheathing Leaves from four to six, membranous, about an inch and a half (0.038 metre) in length, in the type falling short of the proper spathe; in var. *Suwarrowianus*, exceeding the double proper spathe.

Proper Leaves four or five to a corm, dormant at the autumnal flowering time, and produced in the spring to a length of ten or eleven inches (0.250—0.300 metre) one eighth of an inch (0.0032 metre) broad, glabrous, with an obscure central white band, the keel as broad as the blade, and separated from it by deep lateral channels, with a glaucous surface.

Basal Spathe membranous, about half an inch (0.013 metre) long, tubular, and open for about half its height. *Proper Spathe* in the type monophyllous, foliaceous, from two and a half to three inches (0.063—0.075 metre) in length, exceeding the sheathing leaves, and reaching to within an inch (0.025 metre) of the throat. In var. *Suwarrowianus*, diphyllous, membranous, three-quarters of an inch (0.019 metre) in length, falling short of, and hidden within the sheathing leaves.

Perianth: Tube, buff, about three and a half inches (0.088 metre) in length from the ovary to the throat. *Throat* in the type bearded; in var. *Suwarrowianus* unbearded. *Segments* lanceolate, from an inch and three-quarters (0.044 metre) to two and a half inches (0.063 metre) long, and five-eighths of an inch (0.016 metre) broad, in the type terminating in a fine thread-like point, pale cream-colour, veined internally with from five to seven fine purple lines, and bearing two small orange spots towards the throat; in var. *lilacinus* internally and externally veined with feathered purple markings.

Stamens falling short of pistil, about three-quarters of an inch (0.019 metre) high. *Anthers* pale cream-colour, somewhat longer than the white glabrous *Filament*. *Pollen Grains* $\frac{1}{330}$ of an inch (0.00008 metre) in diameter, papillose, pale cream-colour.

Pistil about an inch and a quarter (0.032 metre) in height from the throat, much exceeding the stamens, the style dividing a little above the summit of the anthers, and shortly produced into spreading, nearly entire stigmata, which are cream-coloured in the type, and orange in var. *Suwarrowianus.*

Scape about half an inch (0.013 metre) high at the flowering time, and produced to a height of two and a half inches (0.063 metre) at the maturity of the capsule.

Capsule pale buff, about three-quarters of an inch (0.019 metre) long, the extremities of the valves produced into fine points about three-sixteenths of an inch (0.005 metre) long.

Seed one-tenth of an inch (0.0025 metre) high, one-sixteenth of an inch (0.0016 metre) broad, the surface papillose, and bearing a few hairs, dull buff, the chalaza, raphe, and caruncle not very prominent, of the same colour as the body of the seed.

Var. 1. *lilacinus*, Figs. 6, 10, and 11, from Stauros near Trebizond, a single corm of which was obtained for me by Mr. A. Biliotti, Her Majesty's Consul at Trebizond, is much smaller than the type, and the perianth segments are delicately coloured throughout with a network of lilac veins.

Var. 2. *Suwarrowianus*, Figs. 2, 3, 5, 8, 12, and 15, from the Pallan ducken mountains near Erzeroum, differs from the type in so many important characters that I have had some hesitation about uniting it with this species. I described it in the *Gardeners' Chronicle* as a variety of *C. vallicola*, under the name of *Zohrabii;* but Monsieur Boissier has pointed out to me that the type specimens of K. Koch's *C. Suwarrowianus* are evidently identical with the Erzeroum plant, and agrees with me in the necessity of separating it from Herbert's type in some way. Notwithstanding its several points of difference, viz, its beardless throat, the short double proper spathe, the orange stigmata, the less acute segments, and the later flowering time, I feel better satisfied to place it as a well-marked variety of Herbert's *C. vallicola*, than as a distinct species.

Crocus vallicola is a native of the high mountains of Armenia, Lazistan, Kurdistan, Georgia, and the Caucasus, at elevations ranging from six thousand to eight thousand feet; occurring between 38° and 45° east longitude, and 38° and 44° north latitude. Tchihatcheff, in his *Asie Mineur*, refers to its occurrence (as *C. Suwarrowianus*,) in the neighbourhood of Broussa in Western Bithynia, but I think the record must be erroneous. Broussa is ten degrees west of the most westerly point at which the species has been elsewhere found. Mount Olympus is the only sufficiently high land near to Broussa; but on this mountain, which I have twice ascended, I failed to find it, and the species collected for me there on several occasions by Mr. Gilbertson, Her Majesty's Vice Consul, have never included it.

Ruprecht, in Regel's *Gartenflora*, records its occurrence, in company with *C. Scharojani*, on the north slope of the western Caucasus, near the high Mount Ostchen, in the district of Abadsechen. Dr. Radde, of Tiflis, informs me that he has found it near the Col de Mammisson, midway between Poti and Tiflis, near the source of the river Rion (Phasis), which falls into the Black Sea at Poti. Mr. Ball's herbarium contains a specimen collected by Sir A. Henry Layard in Kurdistan. The type form of the species was known in 1846 to Dean Herbert, who described it from specimens obtained from elevated mountain hollows of the Alps of Trebizond, on the mountain Koulak Dagh, near the village of Stauros. Balansa, in 1866, again collected the plant from the same locality, and also in the

alpine valley of Djimel, Lazistan, where he found it in flower as early as July. From the Koulak Dagh and Kroom Dagh mountains I have had the pleasure of introducing this species to cultivation, through the kind offices of Mr. A. Biliotti, Her Majesty's Consul at Trebizond, who has on several occasions sent me liberal supplies of the living corms, intermixed with those of *C. Scharojani.* Pavillon collected the var. *Suwarrowianus* on the Teck Dagh, near Erzeroum, at elevations of from six thousand to six thousand five hundred feet; and to Mr. James Zohrab, Her Majesty's Consul at Erzeroum, I am indebted for living corms from the Palan-ducken range, near Erzeroum. Monsieur Boissier records its occurrence at Letschkum, Ossetiâ *(C. Koch)*, Alagir, and Radscha *(Ruprecht)*, in the Caucasus.

Crocus vallicola is one of the earliest autumnal species: it appears above ground with a remarkably rapid growth about the middle of August. The large pale cream-coloured flowers, produced without leaves which are developed in the ensuing spring, are very fugacious, lasting only three or four days. The flowers of the type form are over early in September, and are succeeded by those of the variety *Suwarrowianus* which last into October.

The species when once established is easy of cultivation, and is most attractive for the decoration of the rock garden or herbaceous border.

REFERENCES TO PLATE II.

Fig. 1. Flowering-state, September 4th, of type form, from Stauros, near Trebizond, actual size.
Fig. 2. Fruiting-state, June 5th, of var. *Suwarrowianus*, from Erzeroum, actual size.
Fig. 3. Flowering-state, September, of var. *Suwarrowianus*, from Erzeroum, actual size.
Fig. 4. Diagrammatic dissection of scape, ovary, and spathes of type form, actual size.
Fig. 5. Diagrammatic dissection of scape, ovary, and spathes of var. *Suwarrowianus*, actual size.
Fig. 6. Stamens and Pistil of var. *lilacinus*, from Stauros, magnified two-fold.
Fig. 7. Stamens and Pistil of type form, from Stauros, magnified two-fold.
Fig. 8. Stamens and Pistil of var. *Suwarrowianus*, from Erzeroum, magnified two-fold.
Fig. 9. Stigmata of type form, from Stauros, magnified six-fold.
Fig. 10. Flower of var. *lilacinus*, September 5th, actual size.
Fig. 11. Inner surface of segment of var. *lilacinus*, actual size.
Fig. 12. Inner surface of segment of var. *Suwarrowianus*, actual size.
Fig. 13. Inner surface of segment of type form, actual size.
Fig. 14. Pollen Grain, magnified one hundred and fifty-fold.
Fig. 15. Seed of var. *Suwarrowianus*, magnified six-fold.
Fig. 16. Corm tunic, magnified two-fold.
Fig. 17. Leaf-section, magnified six-fold.

Fig. 1, **CROCUS VALLICOLA**, *Herbert.*
Fig. 10, var. 1. lilacinus, G. Maw.
Fig. 3, var. 2. Suwarrowianus, K. Koch.

G. Maw, del. F. Huth, Lith^r Edin^r

3. CROCUS SCHAROJANI.

Section: Involucrati; membranacei *(Herbert)*: Holostigma; autumnal *(Baker)*.

Crocus Scharojani, Ruprecht in Regel's Gartenflora, vol. xvii, pp. 134-5, tab. 578, fig. 2 *a*, *b*, & *c*; Masters in Gard. Chron. 1868, p. 1338; Baker, Rev. Sp. Crocus in Gard. Chron. new series, 1873, p. 1431; List Crocus in Journ. R. Hort. Soc. Lond. new series, vol. iv, 1877; Syst. Iridac. in Journ. Linn. Soc., Bot., xvi, p. 83; Clarke in Gard. Chron. Aug. 16, 1879; G. Maw in Gard. Chron. August 9, 1879, and vol. xii, p. 235; Synops. Genus Crocus in Gard. Chron. new series, vol. xvi, p. 148; Hist. Crocus in Jour. Linn. Soc., Bot., vol. xix, p. 372; and in The Garden, vol. xxi, No. 532, p. 66; Boiss. Fl. Orient. vol. v, p. 97.

Cormus minimus, vix $\frac{1}{2}$ poll. (0.013 metr.) latus, globosus, uniflorus; tunica tenuis fibro-membranacea. Vaginæ quam spatha breviores. Folia vernalia glabra, $\frac{1}{8}$ poll. (0.0032 metr.) lata, ad florationem, permanentia. Spatha monophylla, vaginas duplicans. Perianthium splendide aurantiacum, haud striatum; faux haud barbata. Antheræ pallide flavæ, stigmata superantes; pollen lacteum. Stylus ad basim antherarum in stigmatibus integris aurantiaco-coccineis fissus. Semina globosa, obscure ochrea.

Corm small globose, or depresso-globose, about half an inch (0.013 metre) wide, and one-third of an inch (0.0084 metre) high. *Tunic* of thin delicate fibro-membrane.

Sheathing Leaves three or four, from half an inch (0.013 metre) to an inch and three-quarters (0.044 metre) in length, the longest foliaceous at its extremity.

Proper Leaves three to a corm, dormant at the autumnal flowering-time, and produced in the spring to a length of ten inches (0.250 metre), and often persistent till the ensuing flowering-time, the two years' sets of leaves existing contemporaneously, one-eighth of an inch (0.0032 metre) broad, glabrous, the convex keel as broad as the concave blade, separated by open lateral channels, the blade without the usual central white band.

Basal Spathe an inch (0.025 metre) in length, tubular, membranous. *Proper Spathe* monophyllous, three inches (0.075 metre) long, much exceeding the sheathing leaves, foliaceous at the extremity, and reaching to within two inches (0.050 metre) of the throat.

Perianth: Tube about four or five inches (0.100—0.125 metre) long from the ovary to the throat. *Throat* unbearded, orange. *Segments* lanceolate, one and a half to one and three-quarters of an inch (0.038—0.044 metre) long, and from one-third to five-twelfths of an inch (0.0084—0.0110 metre) broad, the inner segments rather shorter than the outer, the corm producing a single flower at the end of July or early in August.

Stamens seven-eighths of an inch (0.022 metre) high, exceeding the pistil. *Anthers* five-twelfths of an inch (0.011 metre) high, cream-coloured, the pale orange *Filament* five-twelfths of an inch (0.011 metre) high. *Pollen Grains* $\frac{1}{350}$ of an inch (0.00007 metre) in diameter, papillose, pale cream-coloured.

Pistil shorter than the stamens, about three-quarters of an inch (0.019 metre) high from the throat, the orange style dividing at the level of the base of the anthers, and shortly produced into subentire, fringed, orange stigmata.

Scape half an inch (0.013 metre) high at the flowering time, and produced to a height of an inch and a half (0.038 metre) at the maturity of the capsule, which it bears at the ground surface.

Capsule about an inch (0.025 metre) in length, sharply pointed.

Seed globose, one-tenth of an inch (0.0025 metre) in diameter, of a uniform dull buff-colour, and bearing prominent chalaza, raphe, and caruncle.

Crocus Scharojani was discovered by Herr Scharojan, a native of the Caucasus, in August, 1865, at a height of eleven hundred toisen, or seven thousand feet, on the north side of the watershed of the source of the river Bjeleja, near the high Mount Oschen, in the district of Abadsechen, in the western Caucasus, growing intermixed with *C. vallicola*, and was only known till recently by two of Scharojan's specimens preserved in the herbarium of Dr. Nador, of Tiflis, and two others in the herbarium of the St. Petersburg Academy of Science, from which latter the figure in Regel's *Gartenflora* was taken.

From so remote a district, difficult of access, all efforts to introduce the plant to cultivation proved fruitless, till it turned up accidentally amongst a parcel of roots of *C. vallicola*, obligingly obtained for me from the Kroom Dagh, above Stauros, near Trebizond, by Mr. Alfred Biliotti, Her Majesty's Consul at Trebizond. My friend, Colonel R. Trevor Clarke, of Welton Place, near Daventry, was the first to flower it, at the end of July, 1879. In the following year I again flowered it; and Mr. Biliotti has since obtained for me a further supply of the roots.

Both the Circassian and Armenian habitats are situated on longitude 40° east; and the species has a range of four degrees of latitude, from 40° to 44° north.

C. Scharojani is nearly allied to *C. vallicola*. The two species are the earliest of the autumnal *Croci: C. Scharojani* commences to flower at the end of July, and early in August, and is immediately succeeded by *C. vallicola*. The singular leaf-structure, in which the keel is as broad as the blade, is common to both species, which grow intermixed in the only two known habitats of *C. Scharojani*. The persistence of the leaves of the previous year up to the autumnal flowering time has, I believe, never been noticed in any other species, *C. karduchorum* excepted.

REFERENCES TO PLATE III.

Fig. 1. Flowering-state, August 2nd, from corms collected at Stauros, actual size.
Fig. 2. Fruiting-state, May 17th, from corms collected at Stauros, actual size.
Fig. 3. Diagrammatic dissection of scape, ovary, and spathes, actual size.
Fig. 4. Stamens and Pistil, magnified two-fold.
Fig. 5. Stigmata, magnified six-fold.
Fig. 6. Pollen Grain, magnified one hundred and fifty-fold.
Fig. 7. Leaf-section, magnified six-fold.
Fig. 8. Corm tunic, magnified two-fold.
Fig. 9. Seed, magnified six-fold.

Fig. 2, May 17th

CROCUS SCHAROJANI, *Ruprecht.*

G Maw, del

F Huth, Lith^r Edin^r

Western Range of the Bulgar Dagh Taurus, the habitat of *Crocus zonatus*, from the gorge of the Cydnus near Zebel,
From a Drawing by C. G. DANFORD, ESQ.

4. CROCUS ZONATUS.

Section: Involucrati; parallelo-fibrosi *(Herbert)*: Holostigma; autumnal *(Baker)*.

Crocus zonatus, Gay in Balansa Pl. Exsic. No. 823, 1855; Klatt. Revis. Irid. in Linnæa, xxxiv, pp. 682 and 720; Baker, Rev. Sp. Crocus in Gard. Chron. 1873, p. 1431; G. Maw in Gard. Chron. 1879, pp. 234-5; Synops. Genus Crocus in Gard. Chron. new series, vol. xvi, p. 234; Hist. Crocus in Journ. Linn. Soc., Bot., vol. xix, p. 372; and in The Garden, vol. xxi, No. 532, p. 66; Boiss. Fl. Orient., vol. v, p. 98.

Crocus Kotschyanus, K. Koch in Index Sem. Hort. Berol. 1853; Walp. Ann. Bot. vol. vi, p. 51; Anns. Sc. Nat. Ser. iv, vol. i, p. 351; Tchihatcheff, Asie Min. part iii, Bot., vol. ii, p. 523; Baker, Syst. Iridac. in Journ. Linn. Soc., Bot., vol. xvi, p. 83; and List of Crocuses in Journ. R. Hort. Soc. Lond. new ser., vol. iv, 1877.

Not *C. karduchorum* of Kotschy, Pl. Cilic. Exsic., No. 469; which is another species.

Cormus oblatus, altitudine pro latitudine minori quam in ulla alia specie; tunica membranacea fibrosa tenuissima. Vaginæ spatham superantes. Folia glabra, carina paullo angustior quam lamina. Spatha diphylla in vaginis celata. Perianthium: faux barbata, aurantiaca; segmenta roseo-lilacina, intus lineis 5-7 splendide purpureis, et ad basim maculis duabus aurantiacis semicirculatis signata. Antheræ albæ, filamenta flava bis superantibus; pollen lacteum. Stylus parum infra apices antherarum fissus; stigmata breviter ramosa, fimbriata, flava, obscuriora quam antheræ quas superant. Semina obscure lactea, glabra.

Corm oblate, the height in proportion to the width less than in any other species, from an inch (0.025 metre) to an inch and a quarter (0.032 metre) broad, and half an inch (0.013 metre) to five-eighths of an inch (0.016 metre) high. *Tunic* of very thin fibro-membrane; the *Cap* produced at the summit into very short points.

Sheathing Leaves exceeding proper spathe, from five to seven in number, and from half an inch (0.013 metre) to three inches (0.075 metre) in length, the innermost slightly foliaceous at their extremity.

Proper Leaves dormant within the sheathing leaves at the flowering-time in September, and produced in the spring to about a foot (0.300 metre) in length, glabrous, from one-eighth to three-sixteenths of an inch (0.0032—0.050 metre) broad, one-third the width of the blade with a depressed central white band; the keel two-thirds the width of the blade, from which it is separated by wide and open lateral channels with a glaucous surface.

Basal Spathe ligulate, membranous, about an inch and a quarter (0.032 metre) in length. *Proper Spathe* diphyllous, membranous, about an inch and a half (0.038 metre) in length, a little shorter than and hidden by the sheathing leaves, the outer spathe tubular, the inner spathe ligulate.

Perianth: Tube from two and a half to three inches (0.063—0.075 metre) in length from the ovary to the throat, pale buff. *Throat* bearded, bright yellow. *Segments* about an inch and a half (0.038 metre) long, and from half an inch (0.013 metre) to seven-twelfths of an inch (0.015 metre) broad, rosy-lilac, veined internally with from five to seven clear purple lines, and bearing on the inner surface of their base two bright semicircular orange spots.

Stamens falling short of pistil, nearly seven-eighths of an inch (0.022 metre) high. *Anthers* about five-eighths of an inch (0.016 metre) long, white, and about twice the length of the orange *Filament*. *Pollen Grains* $\frac{1}{400}$ of an inch (0.0006 metre) in diameter, papillose, pale cream-coloured.

Pistil about an inch and a quarter (0.032 metre) in height from the throat, the *Style* dividing at, or a little below, the level of the summit of the anthers, and produced into erect, shortly branching pale orange stigmata.

Scape at the flowering-time, in September, from an inch (0.025 metre) to an inch and a half (0.038 metre) in height, and produced to a height of five or six inches (0.125—0.150 metre) at the maturity of the capsule.

Capsule from five-eighths to three-quarters of an inch (0.016—0.019 metre) long, pale cream-coloured.

Seed nearly spherical, about one-tenth of an inch (0.0025 metre) in diameter, glabrous, of a uniform pale cream-colour; the chalaza, raphe, and caruncle not prominent.

Crocus zonatus is a high alpine species, limited to the mountains of Cilicia north of the Cilician Gates, the *Pylæ Ciliciæ* of classical authors, and the Lebanon. It appears have been first discovered by Th. Kotschy in 1853. In the De Candolle herbarium at Geneva there are specimens labelled *C. cilicicus* Kotschy, "*C. specioso M. B. affinis*," southern declivities of Dasch Olug, Tschidem Goli, and Bulgar Magara, alt. 8000 feet, 31st of August, and 22nd of September, 1853." In other herbaria the same label accompanies specimens of the blue form of *C. cancellatus* from the same district.

Balansa again collected the species on September 22nd, 1855, on the alpine part of Jokmus Koty, and Kara Kapu, near the source of the river Irmak Goos, (Cydric) at an altitude of 7400 feet.

M. Boissier's herbarium contains a Crocus which is apparently identical with Balansa's plant, collected by Blanche, in October, 1864, on the road from Dûnân to Hasrûn, in the Lebanon.

The range of the species is a limited one, and the recorded habitats are within 34° 10′ and 36° 40′ north latitude, and 34° 20′ and 36° 0′ east longitude. I have also received corms of *C. zonatus* from Dr. Kerner, supposed to have been collected by Porta, in meadows close to the sea south of Otranto, in Italy. In a letter from Signor Porta, he tells me that he remembers digging up some bulbs there, which he supposed at the time were those of a Romulea. The low elevation, and far removed distance of seventeen degrees, renders the occurrence of *C. zonatus* in Southern Italy highly improbable; and it would seem that some mistake has occurred in the transposition of labels in the Botanic Garden at Innsbruck.

I have had some difficulty in deciding the question of priority of the names applied to this species; respecting which Baker, who in 1873 described the plant as *C. zonatus*, and in 1878 as *Kotschyanus*, seems also to have been in doubt. I have come to the conclusion that the name *Kotschyanus* is inadmissible, as in 1846 it had been applied by Herbert to a variety of *C. cancellatus* from the Taurus, and therefore should not have been given to another species more recently known.

Tchihatcheff in 1860, Klatt in 1865, and Baker in 1873, adopted Gay's herbarium name of *zonatus*.

Crocus zonatus is one of the earliest autumnal species, the flowers immediately succeeding those of *C. Scharojani*, and *C. vallicola:* from the middle to the end of September, and into October. The rosy-lilac flowers with the bright golden throat are, when expanded, objects of remarkable beauty. As in most of the early autumnal species, they appear above ground with a rapid growth, and soon pass away. This species is nearest allied to *C. vallicola*, and *C. Scharojani* of Asia Minor and the Caucasus; the remarkable structure of the leaf with an exceptionally broad keel, and the pale cream-coloured anthers and pollen grains are common

to all three species; and in the veining of the interior of the segments, the bright golden guttæ above the throat, the colour and shape of the seed, and in the exceptionally flat corm, *C. zonatus* and *C. vallicola* closely resemble each other.

C. zonatus is easy of cultivation, and multiplies rapidly; but is best grown to advantage under the protection of a bell-glass, or cold frame.

REFERENCES TO PLATE IV.

Fig. 1. Flowering-state, September 12th, actual size.
Fig. 2. Fruiting-state with matured leaves and capsule, May 20th, actual size.
Fig. 3. Diagrammatic dissection of scape, ovary, and spathes, actual size.
Fig. 4. Interior of segment, actual size.
Fig. 5. Stigmata, magnified six-fold.
Fig. 6. Stamens and Pistil, magnified two-fold.
Fig. 7. Pollen Grains, magnified one hundred and fifty-fold.
Fig. 8. Seed, magnified six-fold.
Fig. 9. Leaf-section, magnified six-fold.
Fig. 10. Corm tunic, magnified two-fold: *a*, Main tunic and Cap; *b*, Basal tunic.

CROCUS ZONATUS, *Gay.*

C. Kotschyanus, K. Koch.

G. Maw, del. F. Huth, Lith. Edin.

5. CROCUS KARDUCHORUM.

Section: Involucrati; membranacei (*Herbert*): Schizostigma; autumnal (*Baker*).

Crocus karduchorum, Kotschy, Iter. Cilico-Karducum, 1859. No. 469, Exsic. Plantæ ex montibus calcariis, Karduchiæ; G. Maw in Gard. Chron. 1879, p. 234; Synops. Genus Crocus in Gard. Chron. new series, vol. xvi, p. 234; Hist. Crocus in Journ. Linn. Soc., Bot., vol. xix, p. 372; and in The Garden, vol. xxi, No. 532, p. 66; Boiss. Fl. Orient. vol. v, p. 99.

Crocus zonatus, in part, Baker, Rev. Sp. Crocus in Gard. Chron. 1873, p. 1431.

Crocus Kotschyanus, in part, Baker, List of Crocuses in Journ. R. Hort. Soc. Lond. new ser., vol. iv, 1877; and Syst. Iridac. in Journ. Linn. Soc., Bot., xvi, p. 83.

Cormus parvus, altitudine latitudine subæquante; tunica tenuis fibro-membranacea, apice in fasci cuspidum acutarum producto. Vaginæ spatha subæquantes. Folia insigniter parva breviaque $1\frac{1}{2}$—2 poll. (0.038—0.050 metr.) longa, $\frac{1}{20}$ poll. (0.0013 metr.) lata, foliis annotinis ad florationem autumnalem permanentibus. Spatha monophylla, circiter 1 poll. (0.025 metr.) alta. Perianthiumr tuba longe e vaginis et spatha exserta; faux haud barbata, cum segmentis vineo-lilacinis concolo: apparet. Hæc 1 ad $1\frac{1}{4}$ poll. (0.025—0.032 metr.) sunt. Antheræ lacteæ, longitudinem filamentorum duplicantes. Stylus prope apicem antherarum fissus, acervum ramorum capillaceorum stigmaticorum lacteorum fert.

Corm nearly spherical, from half an inch (0.013 metre) to two-thirds of an inch (0.017 metre) broad and high. *Tunic* a thin delicate membrane, interspersed with fine nearly parallel fibres; the *Cap* produced into a bunch of fibro-membranous points reaching about half an inch (0.013 metre) above the summit of the corm.

Sheathing Leaves from four to five, the two or three innermost nearly equal, and about an inch (0.025 metre) in height, nearly equalling the proper spathe.

Proper Leaves glabrous, dormant at the autumnal flowering-time, produced in the spring to a length of from one and a half to two inches (0.038—0.050 metre), very narrow, one-twentieth of an inch (0.0013 metre) broad, persistent till the ensuing flowering-time, when the two years' sets of leaves exist together.

Basal Spathe about three-quarters of an inch (0.019 metre) long, tubular, open for about half its height. *Proper Spathe* monophyllous, about three-quarters of an inch (0.019 metre) in length, of about the height of the sheathing leaves.

Perianth: Tube from two to three inches (0.050—0.075 metre) in length from the ovary to the throat. *Segments* from one inch (0.025 metre) to an inch and a quarter (0.032 metre) in length, five-twelfths of an inch (0.011 metre) broad, vinous lilac in colour.

Stamens about seven-eighths of an inch (0.022 metre) in height, shorter than the pistil. *Anthers* pale yellow, about seven-twelfths of an inch (0.015 metre) long. *Filament* white, about half the length of the anthers.

Pistil exceeding anthers; the *Style* dividing a little below the summit of the anthers, and produced into a spreading mass of cream-coloured capillary stigmata.

Scape at the flowering-time about half an inch (0.013 metre) in height.

Capsule and *Seed* unknown.

Crocus karduchorum is only known from the herbarium specimens collected by Theodore Kotschy, who discovered it in flower on the 27th. of September, 1859, on a mountainous ridge between Müküs (Mukush?) and Sherwan, in Kurdistan, south of Lake Van, latitude 38° north, and longitude about 42° east, at an altitude of 6000 feet.

It has been erroneously identified with Gay's *Crocus zonatus*, from which it differs in all its more important characters. It has no near ally, and is remarkable for retaining the leaves of the preceding season's growth up to the autumnal flowering time; *C. Scharojani* is the only other species in which two years sets of leaves exist contemporaneously. *C. karduchorum* is also one of the few species in which the sheathing leaves reach to the level of the proper spathe.

REFERENCES TO PLATE V.

Fig. 1. Flowering-state, September 27th, from specimens in the herbarium of the University of Vienna, actual size.
Fig. 2. Diagrammatic dissection of scape, ovary, and spathes, actual size.
Fig. 3. Stamens and Pistil, magnified two-fold.
Fig. 4. Stigmata, magnified six-fold.
Fig. 5. Corm tunics, magnified two-fold: *a*, cap; *b*, fragment of main tunic.

Fig. 1. Sep^r 27^th.

CROCUS KARDUCHORUM, *Kotschy.*

J Maw del. F Heath, Lith^r Edin^r

Vallée du Lys, near Luchon, Pyrenees.

6. CROCUS NUDIFLORUS.

Section: Involucrati; parallelo-fibrosi *(Herbert)*: Schizostigma; autumnal *(Baker)*.

Crocus nudiflorus, (not *C. nudiflorus*, Sibth. and Smith, Prod. Fl. Græc. p. 23, which is *C. cancellatus* Herbert); Smith, Eng. Bot. ed. i, 1798, tab. 491, ed. 3, tab. 1500; Brit. Fl. vol. i, p. 41; Salisbury drawing, Bibl. Bot. Brit. Museum; Benth. Cat. Pl. Pyr. p. 73; Ker Irid. Gen. p. 78; Gay in Féruss. Bull. Sc. Nat. xi, p. 353, also two drawings, Bibl. J. D. Hooker; Roem. et Schult. Syst. 11, p. 369; Baxt. Brit. Bot. tab. 137; Hook. and Arn. Brit. Fl. ed. 8, p. 442; Gren. and Godr. Fl. France, vol. iii, p. 237; Bab. Man. Brit. Bot. ed. 4, p. 326; Willkomm and Lange, Prod. Fl. Hisp. vol. i, p. 146, in part; Baker, Rev. Sp. Crocus in Gard. Chron. new ser. 1873, p. 1633; List Crocus in Journ. R. Hort. Soc.

Lond. new ser., vol. iv, 1877; Syst. Iridac. in Journ. Linn. Soc., Bot., vol. xvi, p. 85; J. D. Hooker, Stud. Fl. ed. 2, p. 384; G. Maw in Gard. Chron. new ser. 1879, p. 234-5; Synops. Genus Crocus in Gard. Chron. new ser., vol. xvi, 1881, p. 234; Hist. Crocus in Journ. Linn. Soc., Bot., vol. xix, p. 372; and in The Garden, vol. xxi, No. 532, p. 66.

C. multifidus, Ramond in Bull. Soc. Phil. ii, p. 129, tab. 8; Thore, Essai d'une Chloris du Départ. des Landes; Lamk. and Decand. Fl. France, iii. p. 242; Duby and Decand. Bot. Gall. 453; Philippe Fl. Pyr. vol. ii, p. 344; Klatt Revis. Irid. in Linnæa, vol. xxxiv, pp. 686 and 721.

C. pyrenæus purpureus, Parkinson, Parad. p. 168-169.

C. pyrenæus, Herbert, Hist. Crocus, sp. 3, p. 9, from Journ. Hort. Soc. Lond., vol. ii, p. 255; also drawing Lindl. Libr. Bibl. R. Hort. Soc. Lond.

C. speciosus, (not *C. speciosus* M. Bieb.) Wilson in Eng. Bot. Supp. tab. 2752.

C. fimbriatus, Lapeyr., Abr. Pyr. p. 22.

Cormus parvus, globosus vel depresso-globosus; tunica fibro-membranacea. Planta increscit stolonibus longis e cormo undique orientibus qui parente mortuo cormi liberi facti sunt. Vaginæ foliaceæ, quam spatha breviores. Folia glabra, $\frac{1}{8}$ poll. (0.0032 metr.) lata, in vere ad 9—12 poll. (0.225—0.300 metr.) producta. Spatha monophylla ad apicem foliacea circiter 6 poll. (0.150 metr.) longa, vaginas multo superans. Perianthium: tuba circa 7 poll. (0.175 metr.) longa; faux haud barbata; segmenta splendide cærulescens-purpurea estriata ad $2\frac{1}{8}$ poll. (0.0532 metr.) longa, $\frac{3}{4}$ poll. (0.019 metr.) lata. Flos singulus, autumnalis. Antheræ pallide aurantiacæ, $\frac{3}{4}$ poll. (0.019 metr.) longæ, filamentis albis plus quam duplo longiores. Stylus ad apicem antherarum fissus. Stigmata brevia aurantiaca capillacea congesta. Semina pallide ochrea.

Corm nearly spherical or oblate, from one-half to two-thirds of an inch (0.013—0.017 metre) broad, and from one-third to half an inch (0.0085—0.0130 metre) high; the new growths, which commence in July, are produced from various parts of the corm as long stolon-like fusiform shoots, from two to four inches (0.050—0.100 metre) in length, which form independent corms on the death of the parent. *Tunic* a rich brown membrane combined with parallel fibres. The *Cap* fibro-membranous, produced into points at the summit, from a quarter to half an inch (0.0063—0.0130 metre) in height. *Basal Tunic* of thin fibres, radiating from a coriaceous disc.

Sheathing Leaves about five, from three-quarters of an inch (0.019 metre) to three inches and a half (0.088 metre) in length, the longest slightly foliaceous at the extremity, and falling short of the proper spathe.

Proper leaves three or four, dormant at the flowering-time, and produced in the spring to from nine to twelve inches (0.225—0.300 metre) in length, one-eighth to three-sixteenths of an inch (0.0032—0.0050 metre) broad glabrous, the margins revolute; keel prominent; lateral channels broad and open, containing two or three prominent ridges.

Basal Spathe about an inch and a half (0.038 metre) in length. *Proper Spathe* monophyllous, about six inches (0.150 metre) in length, much exceeding the sheathing leaves, and reaching nearly to the throat, tubular, foliaceous at the extremity.

Perianth: Tube about seven inches (0.175 metre) long from the ovary to the throat. *Throat* unbearded, lilac externally, white internally. *Segments* about two inches and a half (0.063 metre) long, and ten or eleven-twelfths of an inch (0.021—0.023 metre) broad, rich unstriped bluish purple, rarely white.

Stamens about an inch (0.025 metre) high, shorter than the pistil. *Anthers* tapering upwards, about three-quarters of an inch (0.019 metre) in length, pale orange. *Filament* white, about half the length of the anthers; the *Pollen Grains* $\frac{1}{220}$ of an inch (0.00012 metre) in diameter, papillose, bright orange.

Pistil exceeding stamens, from an inch and a quarter (0.032 metre) to an inch and three-quarters (0.044 metre) in height from the throat, the *Style* dividing at the level of the summit of the anthers, and produced into a compact mass of branching, rich orange stigmata.

Scape three-quarters of an inch (0.019 metre) high at the flowering-time, produced to a length of four or five inches (0.100—0.125 metre) at the maturity of the capsule.

Capsule narrow, about seven-eighths of an inch (0.022 metre) in height, bearing an awn-like prolongation of the remains of the tube and proper spathe.

Seed oblong, three-sixteenths of an inch (0.005 metre) high, pale fawn-colour; the chalaze, raphe, and caruncle lighter in colour than the body of the seed.

THE main continental range of this species consists of a narrow belt, extending from seven and a half degrees west to four and a half degrees east longitude, and from forty-two and a half to forty-four and a half degrees north latitude, ranging from the sea level to a height of nearly six thousand feet, in Galicia, the Asturias, the Pyrenees, the Landes, Aquitania, Herault, and the Cevennes. It has also been recorded from Châtaigneraie in the Department of Vendee, lat. 46° 40′ north, about two degrees north of the general area of its occurrence. The following are some of its recorded habitats: the Sierra Merrama in Galicia, Gijon in the Asturias, Santander and Pancorbo in northern Spain, Biarritz, Bayonne, Dax, Saint Sever, Eaux Bonnes, Gèdre, Gavarnie, Bagnères de Bigorre, Valley d'Aure, Apremont, Gers a Penassac, between Eaux Bonnes and Pau, Parc du Pau, Peyrehorade, Anglès du Tarn, Les Corbières, Vallée du Lys near Luchon, Mont Rion in the Central Pyrenees, and Espinousse in Hérault. There are also several localities in the midland counties of England where *C. nudiflorus* may be mistaken for an indigenous plant—hilly pasture field below Woolstanton Church, one mile from Newcastle, Staffordshire (Mrs. Edwards); Adlington, near Wigan, (Mrs. J. Hoare); Norfolk? (Mrs. J. Hoare); near Shrewsbury, in the Quarry Walks, about The Dingle, in the grass field and the adjoining field to the west, (T. H. Archer Hind); meadows near Manchester, very common; fields at Savile Green, near Halifax; near Derby, (J. Whittaker); Rochdale, (Mrs. Atkins); Warrington, and meadows near Nottingham—but its being really indigenous is very doubtful, as it occurs nowhere in northern France, and the continental area of the species is distant from the English habitats by fully six pegrees of latitude.

There are many records of the occurrence of *C. nudiflorus* in central and southern Spain, but I believe the whole of these are erroneous; I can identify none of the herbarium specimens under the name of *nudiflorus* from central Spain and the Sierra Nevada with the Pyrenean plant. The Crocus I have on several occasions gathered on the Sierra Guadarrama and other localities in central Spain,

is *C. asturicus;* and the Sierra Nevada autumnal Crocus, to which Monsieur Boissier has applied the name of *granatensis*, appears to be also a distinct species.

Parkinson was the first to describe *C. nudiflorus*, in his *Paradisus*, in 1629, under the name of *pyrenæus-purpureus*. Wilson's name of *speciosus*, in the supplement to the English Botany, was probably the result of his having erroneously identified the Nottingham plant with that from the Caucasus.

Gerard, in his *Phytologia Britannica*, published in 1650, does not mention *C. nudiflorus* as a British species; nor does Blackstone, a century later.

Crocus nudiflorus is one of the earliest of the autumnal species. The new growths commence in July, immediately after the maturity of the corm and the dying away of the preceding vernal leaves, each producing a solitary flower whilst the leaves are yet dormant. The flowers are developed with remarkable rapidity early in September, and are fugacious, remaining in perfection only three or four days.

Cultural directions are scarcely required for a plant having the vigour of *Crocus nudiflorus*. It is one of the largest and most ornamental species of the genus, and one which no garden should be without. In a warm open autumn its clear purple flowers form a most attractive addition to the rockwork or herbaceous border; but as the flowers are liable to be broken down and injured by rain, their full beauty can best be preserved under the protection of a large bell-glass of cold frame. In such a situation they form a mass of rich purple, the brilliancy of which is enhanced by the contrast of the colour of the bright golden stamens and stigmata.

Mr. D'Arcy G. Osborne found in the neighbourhood of Biarritz, in the autumn of 1882, a few individuals of a pure white variety (Fig. 1, *d*), which Mr. Barr has in cultivation, also a white variety with a purple throat and stripe.

REFERENCES TO PLATE VI.

Fig. 1. *a*, Flowering-state, September, actual size.
b, and *c*, stolon-like shoots one year old.
Fig. 1. *d*, White variety.
Fig. 2. with matured leaves and capsule, June 14th, actual size.
Fig. 3. Stigmata, magnified six-fold.
Fig. 4. Stamens and Pistil, magnified two-fold.
Fig. 5. Pollen Grain, magnified one hundred and fifty-fold.
Fig. 6. Diagrammatic dissection of scape, ovary, and spathes, actual size.
Fig. 7. Seed, magnified six-fold.
Fig. 8. Section of leaf, magnified twelve-fold.
Fig. 9. Corm tunics, magnified two-fold: *d*, cap; *e*, main tunic; *f*, basal tunic.

Fig 2, June 14th

CROCUS NUDIFLORUS, *Smith.*

C. pyrenœus - purpureus, Parkinson. *C. pyrenœus, Herbert.*

C. multifidus, Ramond. *C. fimbriatus, La Peyrouse.*

G Maw, del.

F Huth, Lith. Edin.

6*b*. CROCUS GRANATENSIS.

Section: Involucrati; parallelo-fibrosi *(Herbert)*: Schizostigma; autumnal *(Baker)*.

Crocus granatensis, Boiss. Exsic.; G. Maw, Hist. Crocus in Journ. Linn. Soc., Bot., vol. xix, p. 372.
Crocus nudiflorus, Boiss., Voyage Bot. Esp. p. 600.
Crocus serotinus, in part, G. Maw, Synops. Genus Crocus in Gard. Chron. new ser. vol. xvi, p. 234.

I abstain from giving a figure or a lengthened description of this plant, because I am in some doubt about its being specially distinct from *C. nudiflorus*, and I am only acquainted with it from the specimens in Monsieur Boissier's herbarium. It is one of the nearly allied autumnal Crocuses of western Europe, of which *C. nudiflorus* is the most familiar type. Its corm, fully an inch (0.025 metre) in diameter, is larger than that of *C. nudiflorus;* and in none of the herbarium specimens can I detect stolon-growths from the corm, which are always present in *C. nudiflorus* at the flowering-time. It differs also from *C. nudiflorus* in occasionally producing more than one flower from within the same set of sheathing leaves.

It differs from *C. serotinus*, *C. Salzmanni*, *C. asturicus*, and *C. Clusii*, in the leaves being dormant at the time of flowering.

The *Corm Tunic* consists of rather strong fibro-membrane, split up into flat, narrow, fibroid divisions.

The *Sheathing Leaves* are from three to four inches (0.075—0.100 metre) in height, and are shorter than the proper spathe. The *Proper Spathe* is monophyllous reaching to within about three-quarters of an inch (0.019 metre) of the throat. The *Perianth Segments* are about an inch and a half (0.038 metre) in length, violet in colour, and apparently without feathered or striped markings. The *Pistil* exceeds the *Stamens* in height; the *Style* dividing near the level of the summit of the anthers, is produced into a mass of branching capillary orange stigmata.

C. granatensis is a native of the Sierra Tegeda and the mountains of Granada, at an altitude of from 4000 to 6500 feet; flowering in September and October. It was collected in 1850, in the Sierra Nevada, by Señor del Campo, of Granada, and distributed by him as *C. nudiflorus*.

It is possible that the species referred to by Willkomm and Lange in their *Prodromus Floræ Hispanicæ*, as *C. serotinus* from the Sierra Morena, may be this plant; and that the Crocus in the Webb Herbarium at Florence, labelled "*nudiflorus*, from the Sierra d'Alfacar, 1000–5000 feet, October 1844," is also *C. granatensis*.

I have made several ineffectual attempts to introduce it to cultivation, and hope that collectors visiting the south of Spain in the autumn will endeavour to obtain it.

7. CROCUS ASTURICUS.

Section: Involucrati; parallelo-fibrosi *(Herbert)*: Schizostigma; autumnal *(Baker)*.

Crocus asturicus, Herbert, Hist. Crocus sp. 8. p. 10, from Journ. Hort. Soc. Lond., vol. ii, p. 255; and in Bot. Mag. sub tab. 3998; G. Maw in Gard. Chron. 1879, p. 234; Synops. Genus Crocus in Gard. Chron. new series, vol. xvi, p. 234; Hist. Crocus in Journ. Linn. Soc., Bot., vol. xix, p. 372; and in The Garden, vol. xxi, No. 532, p. 66.

Crocus nudiflorus, var. *asturicus*, Baker, Rev. Sp. Crocus in Gard. Chron. 1873, p. 1633; List of Crocuses in Journ. R. Hort. Soc., Lond., new ser., vol. iv, 1877; and Syst. Iridac. in Journ. Linn. Soc., Bot., vol. xvi, p. 85.

Cormus circiter $\frac{3}{4}$ poll. (0.019 metr.) latus atque brevior; tunica fibris parallelis cum membrana intermixtis composita. Vaginæ quam spathæ breviores. Spatha monophylla, apice foliacea. Folia glabra cum floribus vix visa, in vere ad 9 poll (0.225 metr.), longa sunt. Perianthium: faux barbata; segmenta purpurea vel alba ad basin lineis obscurioribus signata. Antheræ splendide flavæ rarius brunneæ, stigmatibus subæquantes. Filamenta alba. Stylus ad apices antherarum fissus. Stigmata brevia aurantiaca ramulosa congesta. Semina fusco-ochrea.

Corm from two-thirds of an inch (0.017 metre) to seven-eighths of an inch (0.022 metre) broad, and from half an inch (0.013 metre) to two-thirds of an inch (0.017 metre) high. *Tunic* of flat parallel fibre intermixed with membrane; the *Cap* produced into a few short points. The *Basal Tunic* of short radiating fibres.

Sheathing Leaves four or five, from half an inch (0.013 metre) to two and a half inches (0.063 metre) in length, shorter than the proper spathe, membranous, enclosing one or more scapes.

Proper Leaves four or five, a little longer than the sheathing leaves at the flowering-time, and produced in the spring to about a foot (0.300 metre) in length, three-sixteenths of an inch (0.005 metre) broad, glabrous, the keel about half the width of the blade, the lateral channels broad and open, with a glaucous surface.

Basal Spathe about an inch and a half (0.038 metre) in height, tubular. *Proper Spathe* monophyllous, three inches (0.075 metre) in height, exceeding the sheathing leaves, foliaceous at the extremity.

Perianth: Tube from four to five inches (0.100—0.125 metre) long from the ovary to the throat. *Throat* bearded, violet. *Segments* from an inch and a half (0.038 metre) to an inch and three-quarters (0.044 metre) in length, and from half an inch (0.013 metre) to five-eighths of an inch (0.016 metre) broad, violet or purple, with a few darker lines towards the base, very variable in colour, rarely white.

Stamens about seven-eighths of an inch (0.022 metre) high, a little shorter than the pistil. *Anthers* half an inch (0.013 metre) in length, a little longer than the white or pale yellow *Filament*, orange in colour, occasionally chocolate. *Pollen Grains* $\frac{1}{370}$ of an inch (0.00007 metre) in diameter, papillose, bright orange.

Pistil somewhat exceeding stamens, from an inch (0.025 metre) to an inch and a quarter (0.032 metre) high, the *Style* dividing a little below the summit of the anthers, and produced into a compact mass of branching orange stigmata.

Scape barely an inch (0.025 metre) high at the flowering-time, produced to a height of from five to six inches (0.125—0.150 metre) at the maturity of the capsule.

Capsule about an inch (0.025 metre) in length, by a third of an inch (0.0084 metre) broad.

Seed $\frac{3}{20}$ of an inch (0.0038 metre) high, and $\frac{1}{10}$ of an inch (0.0025 metre) broad, dark buff or dun-colour, with prominent caruncle, and slightly projecting raphe and chalaza.

Crocus asturicus is a common species in the north of Spain, ranging between 2° and 7° west longitude, and 40° to 43½° north latitude, from the sea-level to altitudes of from four to five thousand feet. It is extremely abundant in the Asturias, and the Sierra de Guadarrama; flowering in September, October, and into November. I have gathered it on several occasions in the neighbourhood of Gijon, Oveado, near Ferronias, and on the south side of the Puerto de Pajares in the Asturias, also on the mountains above the Escurial, and in other parts of the Sierra de Guadarrama. It also occurs in the neighbourhood of Santander, and probably throughout the north Spanish provinces. Monsieur Boissier's herbarium contains a Crocus in fruit, collected by E. Borgeau in the neighbourhood of Aranjuez (lat. 40° N.), which appears to be identical with the Asturian plant.

C. asturicus is essentially variable in its colouring, the flowers ranging from pale lavender to deep purple, and are occasionally pure white, or white with a purple throat; the segments are generally darker towards the base, and veined with a few dark purple lines, without having any distinct feathered markings. *C. asturicus*, though in general aspect resembling *C. nudiflorus*, is readily distinguished by its bearded throat, and the partial development of the leaves at the flowering-time, when they appear just above the sheathing leaves. It is nearly allied to the south Spanish *C. serotinus*, and *C. Salzmanni;* but its earlier flowering-time, and very short development of proper-leaves at the flowering-time, readily distinguishes it from these species, in which the leaves appear before the flowers, and reach nearly to the level of the flowers at the flowering-time. Many of the records of habitats of *C. nudiflorus* in central and northern Spain refer to this plant.

It is a species of easy culture, and produces seed freely; but is not quite so decorative as a garden plant, nor so readily multiplied as *C. nudiflorus*.

REFERENCES TO PLATE VII.

Fig. 1. Flowering-state, October 4th, actual size.
Fig. 2. With matured leaves and capsule, July 4th, actual size.
Fig. 3. Diagrammatic dissection of scape, ovary, and spathes, and flower of white variety, actual size.
Fig. 4. 6. and 7. Outer surface of segments, actual size.
Fig. 5. Inner surface of segment, actual size.
Fig. 8. *a*, and *b*, Stamens and Pistil, magnified two-fold.
Fig. 9. Stigmata, magnified six-fold.
Fig. 10. Pollen Grain, magnified one hundred and fifty-fold.
Fig. 11. *c*, and *d*, Leaf sections, magnified six-fold.
Fig. 12. Corm tunics, magnified two-fold: *e*, main tunic; *f*, basal tunic.
Fig. 13. *g*, and *h*, Seed, magnified six-fold.

CROCUS ASTURICUS, *Herbert.*

G Maw, del F Huth, Lith^r Edin^r

8. CROCUS SEROTINUS.

Section: Involucrati; sub-paralleli *(Herbert)*: Odontostigma; autumnal *(Baker)*.

Crocus serotinus, Salisb. Parad. Lond. tab. 30, and drawing Bibl. Bot. Brit. Museum; Bot. Mag., sub tab. 1111, and tab. 1267; Loud., Bulb. Plants, tab. 23, fig. 4; Herbert, Hist. Crocus, p. 10, from Journ. Hort. Soc. Lond. 11, p. 256; Gay in Féruss. Bull. Sc. Nat. xi, p. 351; Willk. and Lange, Prod. Fl. Hisp. vol. i, p. 146; Klatt, Revis. Irid. in Linnæa, xxxiv, pp. 683 and 720? Baker, Rev. Sp. Crocus in Gard. Chron. 1873, p. 1466; List of Crocuses in Journ. R. Hort. Soc. Lond., new ser., vol. iv, 1877; and Syst. Iridac. in Journ. Linn. Soc., Bot., p. 83; G. Maw in Gard. Chron. Feb. 26th., 1876, and p. 234-5, 1879; Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, p. 234; Hist. Crocus in Journ. Linn. Soc., Bot., vol. xix, p. 372; and in The Garden, vol. xxi, No. 532, p. 66.

? Crocus autumnalis, Ker, Irid. Gen., p. 77.

? Crocus colchiciflorus, Reuter.

Cormus subglobosus, parum latior quam altus; tunica fibro-membranacea. Vaginæ quam spatha breviores. Folia glabra, angustissima, $\frac{1}{16}$ poll. (0.0016 metr.) lata, flore in Novembro subæqualia, in vere 9-10 poll. (0.225—0.250 metr.) longa. Spatha monophylla, vaginas superans, ferme fauce æqualis. Perianthium: faux barbata; segmenta splendide purpurea, lineis 3-5 purpureis penniformibus ornatis, $1\frac{1}{2}$ poll. (0.038 metr.) longa et $\frac{3}{8}$ poll. (0.010 metr.) lata. Antheræ flavæ, apicibus stigmatorum subæquantes, filamenta alba. Stylus infra apices antherarum fissus, stigmata aurantiaca subintegra patentia, nonnunquam breviora, aliquando longiora quam antheræ.

Corm oblate, about an inch (0.025 metre) wide, and five-eighths of an inch (0.016 metre) high. *Tunic* a thick membrane, splitting up into distinct parallel fibres at the base; the *Cap* produced upwards as a bunch of fibrous points, half an inch (0.013 metre) above the summit of the corm.

Sheathing Leaves about three in number, from half an inch (0.013 metre) to two inches (0.050 metre) in length, shorter than the proper spathe.

Proper Leaves four or five to a corm, well developed and reaching to the throat at the flowering-time, produced in the spring to a length of ten to twelve inches (0.250—0.300 metre), $\frac{1}{10}$ of an inch (0.0025 metre) wide, glabrous.

Basal Spathe a membranous tube about two inches (0.050 metre) long, much exceeding the ovary. *Proper Spathe* generally monophyllous, tubular, two (0.050 metre) or two and a half inches (0.063 metre) long, exceeding the sheathing leaves, occasionally accompanied by a ligulate bract.

Perianth: *Tube* about two and a half or three inches (0.063—0.075 metre) in length from the ovary to the throat. *Throat* bearded, white internally; *Segments* from an inch and three-quarters (0.044 metre) to two inches (0.050 metre) in length, by fully half an inch (0.013 metre) in width, vinous-lilac, the outer surface of the outer segments feathered with darker purple markings.

Stamens about an inch (0.025 metre) high, shorter than the pistil. *Anthers* orange, fully half an inch (0.013 metre) in length, a little longer than the glabrous white filament. *Pollen Grains* $\frac{1}{330}$ of an inch (0.00008 metre) in diameter, slightly papillose, bright orange.

Pistil exceeding stamens, about an inch and a quarter (0.032 metre) in height, the *Style* dividing at

the level of the summit of the anthers, and produced into erect, somewhat branching, orange stigmata.

Scape about three-quarters of an inch (0.019 metre) high at the flowering-time.

Capsule and *Seed* unknown.

Crocus serotinus is reputed to be a south Spanish species, and is nearly allied to *C. Salzmanni*. I am only acquainted with the garden plant, which has certainly been grown during the whole of the present century, possibly in earlier times, as it is said to have been in cultivation for more than two centuries. I have been unable to identify any one of the reputed wild habitats as the source of the plant cultivated under the name of *serotinus*. The species recorded by Herbert as growing in pine forests, near Cadiz, I have had in cultivation for several years, and it is without doubt *C. Clusii* of Gay; which species from Portugal is often found in herbaria under the name of *serotinus*. The species from the Sierra Nevada is nearly allied to *C. nudiflorus*, the leaves remaining dormant till the spring. The north Spanish plant, and that from central Spain, which occur in herbaria under the names of *serotinus* and *nudiflorus*, are *C. asturicus*.

The other records of habitats that may refer to *C. serotinus* of gardens, are the Sierra Morena and the neighbourhood of Jerez (Willkomm and Lange), the Sierra d'Alfacar, the Sierra de San Cristoval, and the Sierra de La Niève, in the province of Granada: but looking at the confusion that exists in herbaria and in the published descriptions of the Spanish and Portuguese autumnal Croci, it is impossible to confidently rely on any single record of a wild habitat of *C. serotinus*.

Crocus serotinus of gardens flowers in November and December—much later than any other autumnal Spanish species—the leaves are well developed before the flowers appear, and reach to the throat at the flowering-time. This character readily distinguishes it from *C. asturicus*, of northern and central Spain, and its corm tunic of parallel fibres distinguishes it from *C. Clusii*, which has a reticulated tunic; the outer surface of the outer segments is regularly feathered with purple markings, which in the other Spanish and Portuguese autumnal species are either absent, ill-defined, or variable.

REFERENCES TO PLATE VIII.

Fig. 1. Flowering-state, October 29th, actual size.
Fig. 2. With matured leaves, April 14th, actual size.
Fig. 3. Diagrammatic dissection of scape, ovary, and spathes, actual size.
Fig. 4. Stamens and Pistil, magnified two-fold.
Fig. 5. Pollen Grain, magnified one hundred and fifty-fold.
Fig. 6. Stigmata, magnified six-fold.
Fig. 7. Section of leaf, magnified six-fold.
Fig. 8. Corm tunics, magnified two-fold: *a*, cap; *b*, main tunic.

CROCUS SEROTINUS, *Salisbury.*

Beni Hosmar, near Tetuan, Marocco. From a drawing by Sir J. D. Hooker.

9. CROCUS SALZMANNI.

Section: Involucrati; sub-paralleli *(Herbert)*: Odontostigma; autumnal *(Baker)*.

Crocus Salzmanni, Gay in Féruss. Bull. Sc. Nat. xxv, p. 320 (220); also two drawings Bibl. J. D. Hooker; Bot. Mag. tab. 6000; G. Maw in Gard. Chron. Feb. 26th., 1876; Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, p. 235; Hist. Crocus in Journ. Linn. Soc., Bot., vol. xix, p. 372; and in The Garden, vol. xxi, No. 532, p. 67.

Crocus Salzmannianus, Herbert in Bot. Mag. 1841, sub tab. 3868; in Bot. Reg. tab. 4, fig. 4; Hist. Crocus, species 6, p. 11, from Journ. Hort. Soc. Lond. 11, p. 257; also drawing Lindl. Lib. R. Hort. Soc. Lond.

Crocus tingitanus, Herbert in Bot. Mag. 1841, sub tab. 3868.

Crocus serotinus, var. *Salzmanni*, Baker, Rev. Sp. Crocus in Gard. Chron. 1873, p. 1466; List of Crocuses in Journ. R. Hort. Soc. Lond., new ser., vol. iv, 1877; and Syst. Iridac. in Journ. Lin. Soc., Bot., xvi, p. 84; Ball Spic. Fl. Maroc. in Journ. Linn. Soc., Bot., xvi, p. 677.

Cormus 1-1¼ poll. (0.025—0.032 metr.) latus, ¾ poll. (0.019 metr.) altus; tunica fibro-membranacea. Vaginæ quam spatha breviores. Folia glabra, flore subæquantia $\frac{3}{16}$ poll. (0.005 metr.) lata, in vere 1½-2 pedalia (0.450—0.600 metr.). Spatha foliacea monophylla, raro altera valva lineari. Perianthium: faux barbata flavescens; segmenta circiter 2 poll. (0.050 metr.) longa, ¾ poll. (0.019 metr.) lata, varie purpureo et lilacino colorata, extus signis obscurioribus penniformibus suffusa. Antheræ cum filamentis atque stigmata stylusque aurantiaca. Stylus ad apicem antherarum fissus, in fasce congestis stigmatibus parum ramosis.

Corm oblate, from an inch (0.025 metre) to an inch and a quarter (0.032 metre) broad, and three-quarters of an inch (0.019 metre) high. *Tunic* fibro-membranous, splitting up into narrow divisions. *Basal Tunic* of radiating fibres, the *Cap* membranous, produced into a bunch of tapering points half an inch (0.013 metre) above the summit of the corm.

Sheathing Leaves from three to four, from half an inch (0.013 metre) to two inches (0.050 metre) in length, falling short of the proper spathe.

Proper Leaves six or seven, well developed before the flowers, and reaching to the level of the flowers at the flowering-time, produced to a length of from twelve to eighteen inches (0.300—0.450 metre) in the spring, about one-seventh of an inch (0.0036 metre) wide, glabrous; the keel narrow and prominent, about one-third the width of the blade.

Basal Spathe about two inches (0.050 metre) in length. *Proper Spathe* generally monophyllous, two and a half to three inches (0.063—0.075 metre) in length, foliaceous at the extremity, and reaching to within an inch (0.025 metre) of the throat, sometimes accompanied by a short ligulate bract.

Perianth: Tube from three to four inches (0.075—0.100 metre) long from the ovary to the throat. *Throat* yellowish, bearded; *Segments* about two inches (0.050 metre) long, and two-thirds of an inch (0.017 metre) broad, vinous lilac, occasionally white, the outer surface of the outer segments variably feathered with purple.

Stamens an inch (0.025 metre) high, shorter than the pistil. *Anthers* fully half an inch (0.013 metre) long, tapering upwards, bright orange, a little longer than the orange *Filament*.

Pistil exceeding stamens, an inch and a quarter (0.032 metre) in height from the throat, the *Style* dividing a little below the level of the summit of the anthers, and produced into an erect bunch of slightly divided orange stigmata.

Scape an inch and a half (0.038 metre) high at the flowering-time.

Capsule and *Seed* unknown.

Crocus Salzmanni is limited to a small district within $35\frac{1}{2}^\circ$ and $36\frac{1}{2}^\circ$ north latitude, and between 5° and 6° west longitude; its head-quarters being the neighbourhood of Tangier. I also found it on the flanks of Beni Hosmar, south of Tetuan, in April, 1869; and again, in 1871, when in company with Sir J. D.

CROCUS SALZMANNI, *Gay.*

C. Salzmannianus. Herbert. *C. tingitanus, Herbert.* *C. serotinus, var. Salzmanni. Baker.*

Hooker and Mr. Ball. We found it nowhere in the Greater Atlas; and Beni Hosmar is the most south-westerly point to which Crocuses are known to extend.

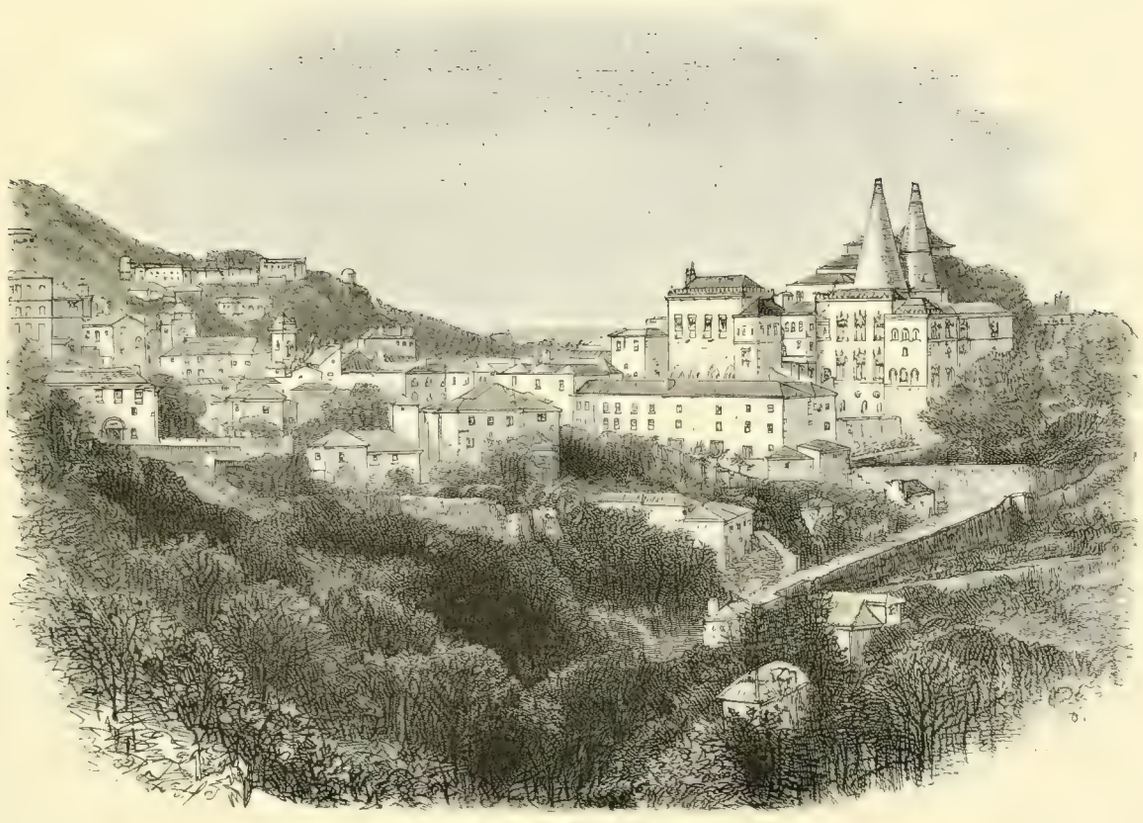
In Monsieur Boissier's herbarium there is a specimen gathered by Reuter, in 1849, in the Sierra de la Niève above Yunquera, twenty-six miles west of Malaga; and in November, 1883, I gathered it on the upper flat terrace above Europa Point, Gibraltar.

C. Salzmanni is the only autumnal species common to Europe and Africa. Herbert states that it was found on the mountains near Tunis, but does not give his authority, and its occurrence there seems improbable, as it is not known to extend into Algeria. If a Crocus has ever been found in Tunis, the Sicilian *C. longiflorus*, looking at geographical proximity, would be the species most likely to occur there.

C. Salzmanni is a free-growing species, flowering from October into November. In general aspect it resembles *C. Clusii*, but is of larger stature, and is readily distinguished from that species by its corm tunic, which is composed of parallel, instead of reticulated fibres; and its fully-developed leaves at the flowering-time distinguishes it from *C. asturicus*, of northern Spain, in which the leaves are only shortly developed when the flowers appear. *C. Salzmanni* flowers about a month earlier than *C. serotinus*.

REFERENCES TO PLATE IX.

Fig. 1. Flowering-state, October, actual size.
Fig. 2. *a*, Outer surface of outer segment; *b*, outer surface of inner segment, actual size.
Fig. 3. With matured leaves, July 27th, actual size.
Fig. 4. Diagrammatic dissection of scape, ovary, and spathes, actual size.
Fig. 5. Stamens and Pistil, magnified two-fold.
Fig. 6. Pollen Grain, magnified one hundred and fifty-fold.
Fig. 7. Stigmata, magnified six-fold.
Fig. 8. Section of leaf, magnified six-fold.
Fig. 9. Corm tunics, magnified two-fold: *c*, cap; *d*, main tunic.



Cintra, Portugal.

10. CROCUS CLUSII.

Section: Involucrati; reticulati *(Herbert)*: Schizostigma; autumnal *(Baker)*.

Crocus Clusii, Gay in Féruss. Bull. Sc. Nat. xxv, p. 320 (220); Baker, Rev. Sp. Crocus in Gard. Chron. 1873, p. 1533; List of Crocuses in Journ. R. Hort. Soc., new ser., vol. iv, 1877; and Syst. Iridac. in Journ. Linn. Soc., Bot., xvi, p. 84; G. Maw in Gard. Chron. Feb. 26th., 1876; Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, p. 235; Hist. Crocus in Journ. Linn. Soc., Bot., vol. xix, p. 372; and in The Garden, vol. xxi, No. 532, p. 67.

Crocus Clusianus, Herbert in Bot. Reg. xxxi, tab. 37, fig. 8; Hist. Crocus, species 21, p. 23, from Journ. Hort. Soc. ii, p. 269; also drawing Lind. Libr. R. Hort. Soc. Lond.

Crocus autumnalis, Brotero, Fl. Lusit. i, p. 49.

Crocus autumnalis, var. multifidus, Brotero, Phyt. Lus. tab. 94.

"*Crocus purpureus*", Exsic. anno 1660, Herb. Sloan. Brit. Museum.

Crocus serotinus, of many herbaria.

Cormus oblatus, $\frac{3}{4}$ poll. (0.019 metr.) latus, $\frac{5}{8}$ poll. (0.016 metr.) altus; tunicæ fibri obscure reticulati. Vaginæ quam spatha breviores. Folia $\frac{1}{16}$ poll. (0.0016 metr.) lata, glabra, ante florationem visa, et tunc floribus subæquantia. Spatha foliacea monophylla, ferme ad faucem producta. Perianthium: tuba brevis; faux barbata lilacina; segmenta $1\frac{1}{2}$ poll. (0.038 metr.) longa, $\frac{1}{2}$ poll. (0.013 metr.) lata, vinoso-purpurea, apud faucem obscuriora. Antheræ pallide aurantiacæ, quam stigmata breviores, filamenta flavescentia. Stylus ad apicem antherarum fissus, fascem ramulorum capillaceorum stigmaticorum aurantiacorum fert. Semina coccinea.

Corm from three-quarters of an inch (0.019 metre) to seven-eighths of an inch (0.022 metre) broad and about two-thirds of an inch (0.017 metre) high. *Tunic* fibro-membranous, reticulated; the *Cap* produced into a short bunch of fibrous points, reaching half an inch (0.013 metre) above the summit of the corm; the *Basal Tunic* of fine, delicate, radiating fibres, reaching nearly half way up the corm.

Sheathing Leaves from three to four, the longest from two to three inches (0.050—0.075 metre) in length, falling short of the proper spathe.

Proper Leaves from five to six, appearing before the flowers, reaching to the flowers at the flowering-time, and produced to a length of nine or ten inches (0.225—0.250 metre) in the spring, glabrous, from $\frac{1}{20}$ to $\frac{1}{16}$ of an inch (0.0013—0.0016 metre) wide, the margins of the blade bearing three prominent ridges, the keel about half the width of the blade.

Basal Spathe about an inch and three-quarters (0.044 metre) long. *Proper Spathe* monophyllous, from two and a half to three inches (0.063—0.075 metre) long, exceeding sheathing leaves, and reaching to within an inch and a half (0.038 metre) of the throat, foliaceous at the extremity.

Perianth: Tube from three to four inches (0.075—0.100 metre) in length from the ovary to the throat. *Throat* distinctly bearded, and white internally. *Segments* about an inch and a half (0.038 metre) long, and half an inch (0.013 metre) broad, bright purple, darker towards the base, but without any distinct feathered markings.

Stamens erect, about three-quarters of an inch (0.019 metre) high, and generally shorter than the pistil. *Anthers* about half an inch (0.013 metre) in length, bright orange, a little longer than the cream-coloured *Filaments*. *Pollen Grains* $\frac{1}{330}$ of an inch (0.00008 metre) in diameter, papillose, bright orange.

Pistil generally higher than the stamens, about an inch (0.025 metre) high; the *Style* dividing near the level of the summit of the anthers, and produced into a compact bunch of the divisions of the branching orange stigmata.

Scape about an inch (0.025 metre) in height at the flowering-time, and produced to a height of from three to three and a half inches (0.075—0.088 metre) at the maturity of the capsule.

Capsule about three-quarters of an inch (0.019 metre) in length.

Seed nearly spherical, one-tenth of an inch (0.0025 metre) in diameter, papillose, and rich reddish brown in colour.

Fig 1 b. Delc. 10

CROCUS CLUSII, *Gay.*

C. Clusianus Herbert. C. autumnalis, Brotero.

J. Maw del. Hanh. Lith. Edinr.

Crocus Clusii has a more westerly extension than any other species of Crocus, and occurs in western Spain and Portugal, between 6° and 9½° west longitude, and 36½° and 42° north latitude. It occurs in pine forests between Chiclana and Port St. Mary, near Cadiz (36½° north latitude); from which locality it was erroneously identified by Herbert as *C. serotinus*. It is a common species in Portugal, and is the only autumnal Crocus occurring there. I have collected it in several localities in the neighbourhood of Lisbon, Cintra, and Oporto. It has been recorded from the Serra d'Arrabida, and pine forests south of the Tagus; Monsanto, near Lisbon; Serra de Cintra, near the Cork Convent; Bellas, near Lisbon; mountains in Estremadura, bordering the Tagus; Beira, Serra de St. Louis; Val Alvatara; Serra d'Estrella, near De Guarda; Serra de Monsar (Mansa?), Estremadura; the Campañha, and granite quarries north of Oporto; and the Serra de Gerez, between the rivers Douro and Miño (Lat. 41°. 45′ n.).

Many herbaria contain this species under the name of *C. serotinus*, from which it is distinguished by its reticulated corm tunic.

Under strict classification *C. Clusii* should be placed with the *Reticulati;* but as its affinities are so obviously with the Spanish and North African autumnal species, it is more consistent with natural grouping to place it here. The rich red papillose seed distinguishes it from any other species occurring in western Europe.

The leaves of *C. Clusii* are well developed before the flowers appear. It commences to flower towards the latter part of September, continuing till November, and into December.

REFERENCES TO PLATE X.

Fig. 1. *a*, *b*, *c*, Autumnal flowering-state, actual size.
Fig. 2. Fruiting-state, June 17th, actual size.
Fig. 3. Diagrammatic dissection of scape, ovary, and spathes, actual size.
Figs. 4 & 5. Stamens and Pistil, magnified two-fold.
Figs. 6 & 7. Stigmata, magnified six-fold.
Fig. 8. Leaf section, magnified twelve-fold.
Fig. 9. Seed, magnified six-fold.
Fig. 10. Corm tunics, magnified two-fold: *d*, cap; *e*, main tunic; *f*, basal tunic.
Fig. 11. Pollen Grain, magnified one hundred and fifty-fold.

11. CROCUS OCHROLEUCUS.

Section: Involucrati; parallelo-fibrosi *(Herbert)*: Odontostigma; autumnal *(Baker)*.

Crocus ochroleucus, Boiss. & Blanche in Boiss. Diag. Ser. 2, iv, p. 93; Tchihatcheff, Asie Min. part iii, Bot., vol. ii, p. 521; J. D. Hooker in Bot. Mag. tab. 5297; Baker, Rev. Sp. Crocus in Gard. Chron. 1873, p. 1466; List of Crocuses in Journ. R. Hort. Soc. Lond., new ser., vol. iv, 1877; and Syst. Iridac. in Journ. Linn. Soc., Bot., xvi, p. 84; G. Maw, Synops. Genus Crocus in Gard. Chron., new series, vol. xvi, p. 235; in The Garden, vol. xxi, No. 532, p. 66; and Hist. Crocus in Journ. Linn. Soc., Bot., vol. xix, p. 372; Boiss. Fl. Orient. vol. v, part i, p. 98.

Cormus oblatus, circiter 1 poll. (0.025 metr.) latus et ½ poll. (0.013 metr.) altus; tunica fibro-membranacea tenuissima. Vaginæ quam spatha breviores. Folia glabra, ⅛ poll. (0.0032 metr.) lata, ad florationem ad faucem producta, in vere circiter pedalia (0.300 metr.). Spatha valvis 1—2 membranaceis confecta. Spatha basalis insigniter longa, vaginis superans. Perianthium: tuba pallide flava; faux barbatula splendide aurantiaca; segmenta circa 1½ poll. (0.038 metr.) longa, ½ poll. (0.013 metr.) lata, lactea, apud faucem flava. Antheræ et pollen lacteæ, filamenta flava. Stylus in mediis antheris fissus, stigmata gracilia denticulata aurantiaca, raro ramosa, nonnunquam antheras superantia.

Corm oblate, about twice as broad as high, an inch (0.025 metre) broad, and half an inch (0.013 metre) high. *Tunic* of fine parallel fibres; the *Cap* fibro-membranous, produced as a bunch of fibres half an inch (0.013 metre) above the corm summit. *Basal Tunic* of fine radiating fibres.

Sheathing Leaves about six, from half an inch (0.013 metre) to two and a half inches (0.063 metre) in length, the three innermost of nearly equal length, and foliaceous at the extremity, falling short of the proper spathe.

Proper Leaves from four to six, glabrous, appearing before the flowers and reaching to the throat at the flowering-time, produced in the spring to a length of ten or twelve inches (0.250—0.300 metre), nearly one-eighth of an inch (0.0032 metre) wide; the keel convex, two-thirds the width of the blade, the lateral channels wide and open.

Basal Spathe from two to three inches (0.050—0.075 metre) in length, ligulate, tubular at the base only. *Proper Spathe* diphyllous, occasionally monophyllous, membranous, about an inch and a half (0.038 metre) in length.

Perianth: Tube about three and a half inches (0.088 metre) from the ovary to the throat, pale buff. *Throat* orange, slightly bearded. *Segments* about an inch and a half (0.038 metre) in length, and half an inch (0.013 metre) broad, pale cream-colour suffused with orange towards the base.

Stamens from three-quarters (0.019 metre) to seven-eighths of an inch (0.022 metre) high. *Anthers* white, half an inch (0.013 metre) in length, exceeding or equalling the orange *Filament*. *Pollen Grains* $\frac{1}{300}$ of an inch (0.00008 metre) in diameter, glabrous, pale cream-coloured.

Pistil about an inch (0.025 metre) in height from the throat; the style dividing at the level of the middle of the anthers, and produced into entire or somewhat divided orange stigmata. The pistil is occasionally shorter than the stamens.

Scape, at the flowering-time, from an inch and a half (0.038 metre) to two inches (0.050 metre) in height; one or more scapes, each having a separate basal spathe, within the same set of sheathing-leaves.

Capsule and *Seed* unknown.

Crocus ochroleucus is a native of Northern Palestine and Syria; occurring between $32\frac{1}{2}^{\circ}$ and $36\frac{1}{2}^{\circ}$ north latitude, and 35° 20′ and $36\frac{1}{2}^{\circ}$ east longitude, on Mount Carmel, es-Sahil Djedaïde (Jedeideh), Anti-Libanus, about Saida, near Beyrout, Ain Salam near Brummana, and elsewhere in the Lebanon, and in the neighbourhood of Iskanderûn (Skanderoun); flowering from October to the end of December, the leaves appearing before, and with the flowers. It has no near ally; the corm is exceptionally flat, quite twice as broad as high, the anthers white with an orange filament, and the flowers pale cream-coloured with an orange throat.

I am indebted to Mr. Löytved, the Danish Consul at Beyrout, and to Mr. Th. Waldmerez, of the Society of Friends' Mission in Mount Lebanon, for liberal supplies of the corms; and I have been enabled to successfully cultivate it. It is a highly ornamental species in the late autumn, and flowers freely in the open air, but is best grown to advantage under the protection of a cold frame.

REFERENCES TO PLATE XI.

Fig. 1. Flowering-state, October 26th, actual size.
Fig. 2. Inner surface of segment, actual size.
Fig. 3. Vernal state, May, actual size.
Fig. 4. Diagrammatic dissection of scape, ovary, and spathes, actual size.
Fig. 5. *a*, *b*, *c*, Stamens and Pistil, magnified two-fold.
Fig. 6. Pollen Grain, magnified one hundred and fifty-fold.
Fig. 7. Stigmata, magnified six-fold.
Fig. 8. Section of leaf, magnified six-fold.
Fig. 9. Corm tunics, magnified two-fold: *d*, cap; *e*, main tunic; *f*, basal tunic.

CROCUS OCHROLEUCUS, *Boissier & Blanche.*

12. CROCUS LAZICUS.

Section: Involucrati; membranacei *(Herbert)*: Holostigma; autumnal? *(Baker)*.

Crocus lazicus, Boiss. in Balansa Plant. Pont. Exsic. 1866, No. 1533; and Fl. Orient. vol. v, part 1, p. 97; Baker, Rev. Sp. Crocus in Gard. Chron. 1873, p. 1431; List of Crocuses in Journ. R. Hort. Soc. Lond., new ser., vol. iv, 1877, and Syst. Iridac. in Journ. Linn. Soc., Bot., xvi, p. 83; G. Maw in Gard. Chron., new series, vol. xvi, p. 235; in The Garden, vol. xxi, No. 532, p. 67; and Hist. Crocus in Journ. Linn. Soc., Bot., vol. xix, p. 372.

Cormus minimus, vix semi-poll. (0.013 metr.) latus, stolonifer; tunica membranacea tenuis. Vagina singula brevis semi-uncialis, quam spatha basalis denudata brevior. Folia glabra, 3 vel 4, cum floribus visa (in Augusto?) faucem superantia, $\frac{1}{16}$ poll. (0.0016 metr.) lata, 3—4 poll. (0.075—0.100 metr.) longa. Spatha monophylla, dimidio tubi, æqualis. Perianthium: faux glabra; tubus aurantiacus, ab ovario ferme sessili, $2\frac{1}{2}$—3 poll. (0.063—0.075 metr.) ortus; segmenta splendide aurantiaca, circiter $1\frac{1}{2}$ poll. (0.038 metr.) apicibus rotundatis. Antheræ aurantiacæ, dimidio filamenti flavi æquantes. Stylus ad summas antheras fissus, stigmata brevia subulata aurantiaca patentia nonnunquam ramosa.

Corm very small, nearly spherical, from a third of an inch (0.0084 metre) to half an inch (0.013 metre) in diameter, bearing long stolon-like shoots. *Tunic* a delicate, thin membrane, produced upwards into a few points, a quarter of an inch (0.0063 metre) above the summit of corm.

Sheathing Leaves two or three, about a quarter of an inch (0.0063 metre) long, membranous, shorter than the basal spathe.

Proper Leaves appearing with the flowers in August (June?), three or four to a corm, from three to four inches (0.075—0.100 metre) in length, one-sixteenth of an inch (0.0016 metre) broad, glabrous, the margins of the blade revolute.

Basal Spathe half an inch (0.013 metre) long, exceeding the sheathing leaves. *Proper Spathe* monophyllous, tubular, from an inch and a half (0.038 metre) to two inches (0.050 metre) in length, reaching about half way up the tube.

Perianth: Tube orange, from two to three inches (0.050—0.075 metre) from the ovary to the throat. *Throat* unbearded, orange. *Segments* obovate, from an inch and a quarter (0.032 metre) to an inch and a half (0.038 metre) in length, and from one-third (0.0084 metre) to five-twelfths of an inch (0.011 metre) broad, rich orange.

Stamens barely an inch (0.025 metre) in height; the *Anther* orange, a little shorter than the yellow *Filament*, which is about half an inch (0.013 metre) in length.

Pistil about an inch and a quarter (0.032 metre) in height from the throat, higher than the stamens; the *Style* dividing high up into spreading orange stigmata, which are generally entire, but occasionally divided.

Scape at the flowering-time barely an eighth of an inch (0.0032 metre) high, the ovary being almost sessile.

Capsule and *Seed* unknown.

Crocus lazicus is not yet in cultivation; and is only known from the herbarium specimens distributed by Monsieur Balansa, who discovered it in the year 1866, in moist meadows in the alpine region of Lazistan, above the villages of Djimel south-east of Trebizond, latitude 40° 40′ north, longitude 40° 45′ east, at an altitude of 8500 feet. Some doubt exists as to the month in which Monsieur Balansa gathered it in flower, though August is named on his labels. In a communication with which he has favoured me, he casually mentions *June* as the time of his visit to Djimel. *C. lazicus* has the aspect of a vernal species; and no other early autumnal species developes leaves till the spring.

M. Balansa informs me that he reached Djimel by way of Rizas, a small sea-port, twenty-five or thirty miles east of Trebizond; and after going inland to Andon, ascended through forests of *Abies Nordmanniana*, and thickets of *Rhododendron caucasicum*, across a bare alpine ridge, at a height of between 10,000 and 11,000 feet, covered with snow. On the southern side of this ridge he descended on Djimel, and found *C. lazicus* by the side of a zigzag path high above the villages, and about 1800 feet lower than the ridge he had crossed from the north.

C. lazicus has no near ally; and is remarkable for its almost sessile ovary, the scape at the flowering-time being scarcely one-eighth of an inch in height. It is the only species in which the almost abortive sheathing leaves are shorter than the basal spathe, which is exposed; and with the exception of *C. nudiflorus*, it is the only Crocus in which the corm is stoloniferous.

REFERENCES TO PLATE XII.

Fig. 1. Flowering-state, actual size, August (June?), from specimens in Monsieur Boissier's Herbarium.
Fig. 2. Pistil, magnified six-fold.
Fig. 3. Stamens and Pistil, magnified two-fold.
Fig. 4. Diagrammatic dissection of scape, ovary, and spathes, actual size.
Fig. 5. Section of leaf, magnified six-fold.

Fig. 1, June ? or August ?

CROCUS LAZICUS, *Boissier.*

G Maw del.

F. Huth, Lith^r Edin^r

Palma, Majorca.

13. CROCUS CAMBESSEDESII.

Section: Involucrati; membranacei *(Herbert)*: Holostigma; autumnal *(Baker)*.

Crocus Cambessedesii, Gay in Féruss. Bull. Sc. Nat. xxv, p. 320 (220); also three drawings, Bibl. J. D. Hooker; Klatt, Revis. Irid. in Linnæa, xxxiv, p. 684; Baker, Rev. Sp. Crocus in Gard. Chron. 1873, p. 1431; List of Crocuses in Journ. R. Hort. Soc. Lond., new ser., vol. iv, 1877; and Syst. Iridac. in Journ. Linn. Soc., Bot., xvi, p. 83; Barcelo, Fl. Isl. Balear. Seg. Cat, p. 15; Mares et Vigineix, Cat. Balear. p. 272; G. Maw, Synops. Genus Crocus in Gard. Chron., new series, xvi, p. 83; in The Garden, vol. xxi, No. 532, p. 67; and Hist. Crocus in Journ. Linn. Soc., Bot., vol. xix, p. 372.

C. Cambessedesianus, Herbert in Bot. Reg. xxxi, tab. 37, fig. 4; Hist. Crocus, species 2, p. 9, from Journ. Hort. Soc. Lond. ii, p. 255; also drawing Lindl. Libr. R. Hort. Soc. Lond.

C. minimus, Camb. non De Cand.

C. versicolor, Barcelo, Fl. Isl. Balear. p. 44 (not *versicolor* of Gawl.).

C. magontanus, Rodrig. Suppl. Cat. Plant. Vasc. Menorca, p. 52.

Cormus pyriformis, circiter $\frac{2}{3}$ poll. (0.017 metr.) latus et altus; tunica fibro-membranacea, in laciniis planis, fibrosis a basi fissa. Vaginæ quam spatha breviores, ovario æquantes. Folia 2-3, $\frac{1}{20}$ poll. (0.0013 metr.) lata, parce glandulosa, fauce ad florationem æqualia. Spatha diphylla. Perianthium: faux glabra; segmenta minima, $\frac{3}{4}$ poll. (0.019 metr.) longa, exteriora pallide ochrea, signis purpureis penniformibus extus ornata, interiora varie colorata, alba vel lilacina. Antheræ flavæ, quam filamenta alba breviores, sæpius stigmatibus superantes; stylus ad faucem vel paullo supra fissus; stigmata aurantiaco-coccinea subintegra haud ramosa. Semina ochrea.

Corm pyriform, about two-thirds of an inch (0.017 metre) broad and high. *Tunic* of strong membrane, split up into narrow fibroid divisions at the base.

Sheathing Leaves about four, about an inch and a half (0.038 metre) in length, reaching to the ovary, and falling short of the proper spathe.

Proper Leaves from two to three, appearing before the flowers, and reaching to the flowers at the flowering-time, produced to a length of five or six inches (0.125—0.150 metre) at the maturity of the capsule, glabrous, very narrow, $\frac{1}{20}$ of an inch (0.0013 metre) broad. The keel about two-thirds the width of the blade, convex; margins of keel and blade obtusely rounded.

Basal Spathe from an inch (0.025 metre) to an inch and a half (0.038 metre) in length, tubular, open for about half its height. *Proper Spathe* diphyllous, about an inch and a half (0.038 metre) in height, and reaching about half way up the tube.

Perianth: Tube from two and a half to three inches (0.063—0.075 metre) in length from the ovary to the throat. *Throat* unbearded, white internally. *Segments* about three-quarters of an inch (0.019 metre) long, and fully one-third of an inch (0.0084 metre) broad, vinous-lilac or white; the outer surface of the outer segments buff, and distinctly feathered with purple.

Stamens barely half an inch (0.013 metre) in height; *Anthers* yellow, somewhat shorter than the white glabrous *Filament*. *Pollen Grain* papillose, orange, $\frac{1}{470}$ of an inch (0.00006 metre) in diameter.

Pistil varying from a quarter of an inch (0.0063 metre) to half an inch (0.013 metre) in height; the *Style* dividing at the throat, or at the level of the base of the anthers, and produced into entire or slightly divided bright orange-scarlet stigmata.

Scape an inch and a half (0.038 metre) high at the flowering-time, produced to a height of two and a half inches (0.063 metre) at the maturity of the capsule.

Capsule about half an inch (0.013 metre) high.

Seed one-sixth of an inch (0.0042 metre) long, and one-tenth of an inch (0.0025 metre) broad, buff, glabrous; the prominent caruncle, chalaza, and raphe of a paler colour than the body of the seed.

Crocus Cambessedesii is limited to the Balearic Islands; and in Majorca and Minorca is fairly abundant between lat. 39° 20′ and 40° north, and long. 2° 20′ and

Fig 5, end of May

CROCUS CAMBESSEDESII, *Gay.*

C. majorcanus, Rodr.

G Maw, del

F Huth, Lith^r Edin^r

4° 20′ east. I am not aware of any record of its occurrence in the island of Ivica, or on the Spanish mainland. It generally occurs at low elevations in woods and heathy thickets. In Majorca it has been recorded from Bellver, Bendinat, Esporlas, eight miles N.N.W. of Palma, Galatzo, Teix, Lluch, (? Lluchmayor, sixteen miles S.E. of Palma), Puix Torrella, and at Andraitx, where I gathered it in a wood of *Pinus halepensis*, one mile south of the village. In Minorca it occurs at Binisarmiña, opposite Port Mahon—where, in company with the late Rev. H. Harpur Crewe, I again gathered it in the spring of 1879, out of flower. It has been recorded also from Otoño, La Mola, San Antonio, Mezquita, Adaya, Forma-nou en Mahon, Santa Ponsa (Ponza) en Alayor, Algayrens, Santa Ana, and Santa Galdana en Ciudadela in Minorca.

In its native habitats it is an autumn-flowering species; but in cultivation is very variable in the time of its flowering, commencing in September, and continuing to flower to the end of March. It is a very diminutive species, both in stature and in the size of the flowers, and has no near ally. Cambessedes erroneously recorded its occurrence in Corsica.

REFERENCES TO PLATE XIII.

Figs. 1. and 2. Flowering-state, October, actual size.
Fig. 3. Outer surface of outer segment, magnified two-fold.
Fig. 4. Outer surface of inner segment, magnified two-fold.
Fig. 5. Fruiting-state, end of May, actual size.
Figs. 6. and 7. Stamens and Pistil, magnified two-fold.
Fig. 8. Stigmata, magnified six-fold.
Fig. 9. Pollen Grain, magnified one hundred and fifty-fold.
Fig. 10. Diagrammatic dissection of scape, ovary, and spathes, actual size.
Fig. 11. Section of leaf, magnified twelve-fold.
Fig. 12. Corm tunic, magnified two-fold.
Fig. 13. Seed, magnified six-fold.

Capri.

14. CROCUS IMPERATI.

Section: Involucrati; sub-paralleli *(Herbert)*: Odontostigma; vernal *(Baker)*.

Crocus Imperati, Tenore, Mem. Croc. Fl. Nap. tab. iii, art. 3, p. 10, et Syll. p. 28; and Fl. Nap. iii, p. 411, tab. 206; v, p. 313; Gay in Féruss. Bull. Sc. Nat. xi, p. 360; and two drawings Bibl. J. D. Hooker; Bert. Fl. Ital. i, p. 209; Sweet, Fl. Gard. ser. ii, vol. iv, p. 98; Bot. Reg. tab. 1993, Rchb. Ic. Crit. tab. 937, fig. 1260; Parlat. Fl. Ital. iii, p. 232; Klatt, Revis. Irid. in Linnæa, xxxiv;

pp. 681 & 720; Baker, Rev. Sp. Crocus in Gard. Chron. 1873, p. 609; List of Crocuses in Journ. R. Hort. Soc. Lond., new ser., vol. iv, 1877; and Syst. Iridac. in Journ. Linn. Soc., Bot., vol. xvi, p. 83; The Garden, vol. vii, p. 242; G. Maw, Synops. Genus Crocus in Gard. Chron., new series, vol. xv, p. 303; in The Garden, vol. xxi, No. 532, p. 67; and Hist. Crocus in Journ. Linn. Soc., Bot., vol. xix, p. 372.

C. Imperatonius, Herbert in Bot. Mag. sub tab. 3871; Hist. Crocus, spec. 8, p. 14, from Journ. Hort. Soc. Lond. ii, p. 260; and drawing Lindl. Libr. R. Hort. Soc. Lond.; Floral Mag. May, 1874, plate iii, fig. 3.

C. neapolitanus (not *C. vernus*, var. *neapolitanus* of Herbert), Ten. in litt. et ad cat. sem. ann. 1825, collector. adnot. p. 11.

C. minimus, var. *a. italicus*, Gay in Féruss. Bull. Sc. Nat. xi, p. 378.

Var. 1. *Reidii*, G. Maw.

Var. 2. *C. albiflos*, Herbert, drawing Lind. Libr. R. Hort. Soc. Lond.; *albus*, G. Maw.

Cormus $\frac{3}{4}$ poll. (0 019 metr.) latus, $\frac{5}{8}$ (0.016 metr.) altus; tunica fibroso-membranacea, sursum parum reticulata. Vaginæ quam spatha breviores. Folia ante florationem apparentia, glabra, $\frac{1}{8}$—$\frac{3}{16}$ poll. (0.0032—0.0050 metr.) lata, post florationem ad 8—9 poll. (0.200—0.225 metr.) elongata. Spatha uni-vel-bivalvis quam faux vix brevior. Perianthium: faux glabra; segmenta $1\frac{3}{4}$ poll. (0.044 metr.) longa, $\frac{2}{3}$ (0.017 metr.) lata, exteriora extus ochrea, signis penniformibus purpureis ornata, vel concolora, interiora splendide purpurea, rosea, vel alba. Antheræ pallide aurantiacæ, quam filamenta longiores. Stylus circiter ad medias antheras fissus. Stigmata ramosa congesta aurantiaca. Semina ochrea.

Corm pyriform, three-quarters of an inch (0.019 metre) broad, and rather less in height. *Tunic* of fine sub-parallel fibres on a membranous base; the *Cap* produced upwards as a short bunch of fibrous points; a separate basal tunic absent, the fibres of the main tunic reaching, and attached to the centre of the base of the corm.

Sheathing Leaves about four, from half an inch (0.013 metre) to two and a half inches (0.063 metre) in length, falling short of the proper spathe, and including several scapes.

Proper Leaves about four, appearing before the flowers, reaching to the throat at the flowering-time, and produced to a length of nine or ten inches (0.225—0.250 metre) at the maturity of the capsule, glabrous, from one-eighth to three-sixteenths of an inch (0.0032—0.0050 metre) broad, the blade and keel concave, the keel about one-third the width of the blade.

Basal Spathe from an inch and a half (0.038 metre) to two inches (0.050 metre) in length. *Proper Spathe* monophyllous or diphyllous, from two to two and a half inches (0.063 metre) in length, exceeding the sheathing leaves.

Perianth: Tube from three to four inches (0.075—0.100 metre) in length from the ovary to the throat. *Throat* orange, unbearded. *Segments* about an inch and a half (0.038 metre) long, and five-eighths to three-quarters of an inch (0.016—0.019 metre) broad, bright pale purple; the outer surface of the outer segments buff feathered with purple, occasionally without markings. In the albino, var. *albidus* of Herbert, the segments are white, and the outer surface of the outer segments buff. In the var. *Reidii*, the segments are bright rose-colour.

Stamens about three-quarters of an inch (0.019 metre) in height; the *Anthers* orange, half an inch (0.013 metre) long, and twice the length of the glabrous yellow *Filament*. *Pollen Grain* $\frac{1}{300}$ of an inch (0.00008 metre) in diameter, papillose, orange.

Pistil equalling or exceeding the stamens, barely an inch (0.025 metre) in height; the *Style* dividing at, or below the level of the summit of the anthers, and produced into spreading, sub-entire, or branched orange stigmata.

Scape barely an inch (0.025 metre) in height at the flowering-time, produced to a height of about five inches (0.125 metre) at the maturity of the capsule.

Capsule about three-quarters of an inch (0.019 metre) in length, pale green, ripening to light buff.

Seed $\frac{3}{20}$ of an inch (0.0038 metre) long, and $\frac{1}{160}$ of an inch (0.0025 metre) wide, buff, ripening to pale brown; the chalaza, raphe, and caruncle very prominent, of a paler colour than the body of the seed.

Crocus Imperati is an abundant species, within a limited district in southern Italy; between 14° and 16° east longitude, and 39° 50′ and 41° 10′ north latitude; from near the sea-level, to an altitude of three or four thousand feet; on Monte Polino, in Northern Calabria; Monte Capaccio, between Capaccio near Pæstum and Fileto; Balvano, province of Basilicata; Monte Flaito; Monte Pontone; about Amalfi, and Val del Mulino d'Amalfi; Minore; Ravello; hedges between Naples and Salerno. In many places on the promontory of Sorrento, including the mountains of Castellamare; Quisisana, above Castellamare, outside the walls of the Royal Palace; Monte St. Angelo; Acqua Santa, above Monte St. Angelo; the end of Capo della Campanella; Monte Solaro; Capri, and other islands off the coast; and Frasso, near Monte Taberno, province of Caserta.

It is one of the earliest of the vernal species, commencing to flower in January in its wild habitats, and in February in English gardens: from its robust habit, and the freedom with which it flowers in the early spring, it is one of the most desirable species for horticultural decoration. It belongs to a group of species, including *suaveolens*, *versicolor*, *minimus*, *corsicus*, and *etruscus*, which do not occur outside the Italian district, **B**. It is very variable in its colour and markings: Plate XIV, Fig. 1, represents the type form; but it often varies with unstriped flowers, Plate XIV*b*, Fig. 1. The albino, var. *albiflos* of Herbert, Plate XIV*b*, Fig. 6, is a rare plant; it has been found sparingly intermixed with the type form in the neighbourhood of Castellamare, Acqua Santa, Mulino d'Amalfi, and in the woods of Chiara, near Ravello. The most remarkable departure from the type colouring is in the var. *Reidii*, (Plate XIV*b*, Figs. 4 and 5,) a single corm of which was obtained by Mr. F. N. Reid by the side of a watercourse, in the Valley of Minore, near Ravello; in this the segments are of a clear rose-colour. *C. Imperati* also varies in sometimes having a double, and sometimes a single proper spathe; as well as in the height and degree of sub-division of the stigmata, which are occasionally almost entire, resembling the stigmata of *C. suaveolens*. It is more closely related to *C. suaveolens* than to any other species; indeed, except in size, *C. suaveolens* being much smaller in all its parts, and in the earlier flowering-time of *C. Imperati*, there is scarcely a reliable character by which they can be distinguished.

REFERENCES TO PLATE XIV.

Fig. 1. Flowering-state, March 4th, actual size.
Fig. 2. *a*, Outer surface of outer segment; *b*, outer surface of inner segment; *c*, inner surface of inner segment; *d*, inner surface of outer segment; actual size.
Fig. 3. With matured leaves and capsule, May, actual size.
Fig. 4. Diagrammatic dissection of scape, ovary, and spathes, actual size.
Fig. 5. Stamens and Pistil, magnified two-fold.
Fig. 6. Stigmata, magnified six-fold.
Fig. 7. Pollen Grain, magnified one hundred and fifty-fold.
Fig. 8. Section of leaf, magnified six-fold.
Fig. 9. Corm tunics, magnified two-fold: *e*, cap; *f*, main tunic; *g*, base of corm.
Fig. 10. Seed, magnified six-fold.

REFERENCES TO PLATE XIV*b*.

Fig. 1. Flowering-state, from Castellamare, April 6th, actual size.
Fig. 2. Inner surface of outer segment, actual size.
Fig. 3. Outer surface of outer segment, actual size.
Fig. 4. Flower of var. *Reidii*, actual size.
Fig. 5. Inner surface of outer segment of var. *Reidii*, actual size.
Fig. 6. Flower of var. *albiflos*, actual size.
Fig. 7. Fruiting-state with matured leaves and capsule, July 10th, actual size.
Fig. 8. Diagrammatic dissection of scape, ovary, and spathes, actual size.
Figs. 9 & 10. Stamens and Pistil, magnified two-fold.
Fig. 11. Stigmata of var. *Reidii*, actual size.
Fig. 12. Stigmata of Fig. 1, magnified six-fold.
Fig. 13. Pollen Grain, magnified one hundred and fifty-fold.
Fig. 14. Section of leaf, magnified six-fold.
Fig. 15. Corm tunics, magnified two-fold: *a*, cap; *b*, main tunic.
Fig. 16. Seed, magnified six-fold.

CROCUS IMPERATI, *Tenore.*

C. Imperatonius, Herbert.

J. Maw del.

F. Huth, Lith^r Edin^r

CROCUS IMPERATI, *Tenore.*

Figs 4. 5 var. Reidii, Maw. Fig. 6. var. albiflos, Herbert.

G. Maw del

F. Hith Lith^r Edin^r

15. CROCUS SUAVEOLENS.

Section: Involucrati; subreticulati *(Herbert)*: Holostigma; vernal *(Baker)*

Crocus suaveolens, Bertoloni, Desc. Zafferan Ital. No. 3; and Fl. Ital. 1, p. 208; Gay in Féruss. Bull, Sc. Nat. xi, p. 349; and three drawings Bibl. J. D. Hooker; Tenore, F. Nap. 5, p. 314, tab. 206, fig. 1; and Syll. p. 30; Sweet, Fl. Gard. Ser. ii, tab. vii, 353; Herbert in Bot. Mag. tab. 3864; Hist. Crocus, sp. 9, p. 14; from Journ. Hort. Soc. Lond. ii, p. 260; and drawing Lindl. Libr. R. Hort. Soc. Lond.; Woods, Tour. Fl. p. 357; Parlat. Fl. Ital. iii, p. 231; Baker, Rev. Sp. Crocus in Gard. Chron. 1873, p. 434; List Crocus in Journ. R. Hort. Soc. Lond., new ser., vol. iv, 1877; and Syst. Iridac. in Journ. Linn. Soc., Bot., vol. xvi, p. 81; G. Maw, Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, p. 303; in The Garden, vol. xxi, No. 532, p. 67; and Hist. Crocus in Journ. Linn. Soc., Bot., vol. xix, p. 372.

Crocus vernus var. *a*, Seb. et Maur. Fl. Rom. Prod. p. 16.

Crocus minimus, var. *a. italicus*, Gay in Féruss. Bull. Sc. Nat. xi, p. 370, ex parte et exclus. syn.

Cormus oblatus, $\frac{3}{4}$ poll. (0.019 metr.) latus; tunica fibris sub-parallelis, cum membrana commixtis. Vaginæ quam spatha breviores. Folia glabra, $\frac{1}{8}$ poll. (0.0032 metr.) lata, flore subæquantia, postea ad 7 vel 8 poll. (0.176—0.200 metr.) elongata. Spatha monophylla. Perianthium: faux glabra, aurantiaca; segmenta angusta, acuta, circiter $1\frac{1}{4}$ poll. (0.032 metr.) longa; exteriora extus ochrea, lineis tribus rectis purpureis ornata; interiora purpurea. Antheræ flavæ, filamenta pubescentia flava duplicantes. Stylus ad medias antheras fissus. Stigmata haud ramosa, dentata, flava, antheris summis subæqualia. Semina ochrea.

Corm oblate, about three-quarters of an inch (0.019 metre) broad, and half an inch (0.013 metre) high. *Tunic* membranous, interwoven with slightly reticulated, nearly parallel fibres; the *Cap* fibro-membranous, produced upwards into very short points. *Basal Tunic* of short radiating fibro-membrane.

Sheathing Leaves three or four, from half an inch (0.013 metre) to two and a half inches (0.063 metre) in length, the longest slightly foliaceous, falling short of the proper spathe.

Proper Leaves four or five, appearing with, and reaching to the level of the flowers at the flowering-time, and produced to a length of eight or nine inches (0.200—0.225 metre) at the maturity of the capsule, one-sixth of an inch (0.0042 metre) broad, glabrous, the lateral channels wide and open.

Basal Spathe about an inch and a half (0.038 metre) in length. *Proper Spathe* monophyllous, from two to two and a half inches (0.050—0.063 metre) in length, exceeding the sheathing leaves, and reaching to within an inch of the throat.

Perianth: Tube from three to four inches (0.075—0.100 metre) in length from the ovary to the throat. *Throat* unbearded, bright orange. *Segments* lanceolate, narrow and acute, about an inch and a half (0.038 metre) long, and three-eighths of an inch (0.010 metre) broad, lilac; the outer surface of the outer segments buff, bearing three unbranched purple lines.

Stamens from five-eighths to three-quarters of an inch (0.016—0.019 metre) high; the orange *Anthers* tapering upwards, barely half an inch (0.013 metre) long, and twice the length of the short yellow *Filament*. *Pollen Grain* orange, $\frac{1}{450}$ of an inch (0.00006 metre) in diameter.

Pistil about three-quarters of an inch (0.019 metre) high; the *Style* dividing at the level of the summit of the anthers, and produced into entire or slightly toothed pale orange stigmata, which reach to the level of, or a little above the summit of the anthers.

Scape about three-quarters of an inch (0.019 metre) high at the flowering-time, produced to a height of an inch and a half (0.038 metre) at the maturity of the capsule.

Capsule about three-quarters of an inch (0.019 metre) high.

Seed $\frac{3}{20}$ of an inch (0.0038 metre) long, and $\frac{1}{10}$ of an inch (0.0025 metre) broad, buff, ripening to pale brown, covered with minute hairs; the chalaza, raphe, and caruncle very prominent, of a paler colour than the body of the seed.

Crocus suaveolens is a native of the environs of Rome, and of a limited district to the south, between 41° 10′ and 42° north latitude, and 12° 20′ and 13° 30′ east longitude. Although bordering on the district to the south, in which *C. Imperati* occurs, the two species do not interlace, but occupy separate areas. *C. suaveolens* occurs at Terracina; on calcareous hills near Fundi; by the roadside between Itri and Fundi in ascending from Itri; on the Campagña of Rome; in pine woods near Rome; near Porcareccio; in the Val d'Inferno; and also in the Botanic Garden of Rome as a wild plant.

I have had some misgivings about retaining *C. suaveolens* as a species distinct from *C. Imperati;* but whilst the latter is very variable, and approaching *C. suaveolens* in many of its characters, *C. suaveolens* never varies in the direction of *C. Imperati.* The corm is smaller and flatter than that of *C. Imperati;* the proper spathe is monophyllous; it flowers somewhat later, and the segments, which are narrow and acute, are never feathered like those of *C. Imperati;* the pollen grain is much smaller; the stigmata, which are of a paler colour than in *C. Imperati*, are entire or sub-entire, and the corm tunic is more distinctly reticulated.

It is a species of ready growth, and flowers freely in the open border in March. The flowers expand more freely than those of *C. Imperati.*

REFERENCES TO PLATE XV.

Fig. 1. Flowering-state. March 22nd. actual size.
Fig. 2. With matured leaves and capsule, June 12th, actual size.
Fig. 3. Diagrammatic dissection of scape, ovary, and spathes, actual size.
Fig. 4. Stamens and Pistil, magnified two-fold.
Fig. 5. Pollen Grain, magnified one hundred and fifty-fold.
Figs. 6 and 7. Stigmata, magnified six-fold.
Fig. 8. Section of leaf, magnified six-fold.
Fig. 9. Seed, magnified six-fold.
Fig. 10. Corm tunics, magnified two-fold: *a*, cap; *b*, main tunic; *c*, basal tunic.

CROCUS SUAVEOLENS, *Bertoloni.*
C. minimus, var. italicus, Gay.

G. Maw del. P. Roth Lith. Edin.

Villafranca, Riviera.

16. CROCUS VERSICOLOR.

Section: Involucrati; subparalleli *(Herbert)*: Holostigma; vernal *(Baker)*.

Crocus versicolor, Gawl. (Ker) in Bot. Mag. vol. xxvii, 1808, tab. 1110; Ker, Irid. Gen. p. 74; Bouché, Gattung Crocus in Linnæa. vol. i, p. 231; Gay in Féruss. Bull. Sc. Nat. ii, p. 369; and four drawings Bibl. J. D. Hooker; Rœm. et Schult. Syst. i, p. 367; Duby and De Cand. Bot. Gall. p. 453; Sabine in Trans. Hort. Soc. Lond. vii, tab. ii, figs. 6-9; Maund, Bot. Gard. p. 151; Bertol. Fl. Ital. 1, p. 212; Perreym. Pl. Fréjus, p. 25; Loud. Bulb. Plants, tab. 23, fig. 6; De Notaris, Prosp. Fl. Ligur. p. 395; Herbert, Hist. Crocus, sp. 7, p. 12; from Journ. Hort. Soc. Lond. ii, p. 259; and three

drawings Lindl. Libr. R. Hort. Soc. Lond.; Woods, Tour. Fl. p. 357; Gren. and Godr. Fl. France vol. iii, p. 237; Parlat. Fl. Ital. iii, sp. 820, p. 221; Ardoino, Fl. Alp. Marit., p. 364; Moggridge Contrib. Fl. Mentone, Plate xl; Baker, Rev. Sp. Crocus in Gard. Chron. 1873, p. 434; List of Crocuses in Journ. R. Hort. Soc. Lond., new ser., vol. iv, 1877. Syst. Iridac. in Journ. Linn. Soc., Bot., vol. xvi, p. 81; G. Maw, Synops. Genus Crocus in Gard. Chron., new series, vol. xvi, p. 303; in The Garden, vol. xxi, No. 532, p. 67; and Hist. Crocus in Journ. Linn. Soc., Bot., vol. xix, p. 372.

C. fragrans, Haworth, in Trans. Hort. Soc. Lond. vol. i, p. 136.

C. meridionalis, Hort and Osborne's Cat. p. 457.

C. vernus, not *C. vernus* of Allioni, Rob. Cat. Toul. p. 49.

? C. crestensis, Eugene, in Bull. Bot. Soc. Fr. xv, p. 190.

? C. Reinwardtii, Rchb. Ic. Crit. tab. 938, fig. 1261.

Cormus pyriformis, $\frac{3}{4}$ poll. (0.019 metr.) latus; tunica fibris parallelis composita. Vaginæ quam spatha breviores. Folia glabra, fauce ad florationem subæquantia, $\frac{1}{8}$ poll. (0.0032 metr.) lata, matura, 8-9 poll. (0.200—0.225 metr.) longa, canaliculis lateralibus bi-vel tri-costatis. Spatha monophylla. Perianthium: faux glabra; segmenta circiter $1\frac{1}{2}$ poll. (0.038 metr.) longa, vel purpurea vel alba concolora, aut venis vel signis purpureis extus ornata; exteriora interioribus subsimilia. Antheræ flavæ, filamenta alba parum glandulosa duplicantes. Stylus prope summas antheras fissus. Stigmata integra aurantiaca haud divergentia. Semina rubra polita

---

Corm shortly pyriform, nearly three-quarters of an inch (0.019 metre) wide, and fully half an inch (0.013 metre) high. *Tunic* fibro-membranous, the fibres parallel, slightly reticulated upwards; the *Cap* shortly produced upwards into sharply-pointed parcels of fibre. *Basal Tunic* of radiating fibres on a membranous base.

Sheathing Leaves from four to five, from half an inch (0.013 metre) to three and a half inches (0.088 metre) in length, falling short of the proper spathe, and containing several scapes.

Proper Leaves from four to five appearing with the flowers, and produced at the maturity of the capsule to a length of eight or nine inches (0.200—0.225 metre), one-sixth of an inch (0.0042 metre) broad, glabrous; the keel concave, about one-third the width of the blade; lateral channels wide and open, containing two prominent ridges.

Basal Spathe two and a half inches (0.063 metre) in length. *Proper Spathe* monophyllous, two and a half inches (0.063 metre) in length, exceeding the sheathing leaves, and reaching nearly to the throat.

Perianth: Tube from four and a half to five inches (0.113 metre) in length from the ovary to the throat. *Throat* unbearded, white, or slightly yellowish, but never orange. *Segments* lanceolate, an inch and a half (0.038 metre) to an inch and three-quarters (0.044 metre) long, and from a third of an inch (0.0084 metre) to half an inch (0.013 metre) broad, varying in colour from white to purple; the outer surface of all the segments either unfeathered, or similarly feathered with purple, or bearing three purple lines.

Stamens three-quarters of an inch (0.019 metre) high; the *Anthers* orange, half an inch (0.013 metre) in length, and twice the length of the white *Filament*. *Pollen Grain* $\frac{1}{330}$ of an inch (0.00008 metre) in diameter, slightly papillose, orange.

Pistil barely an inch (0.025 metre) high, equalling or exceeding the anthers; the *Style* dividing at about the level of the middle of the anthers, and produced into erect, entire, subulate, orange-scarlet stigmata.

Scape from an inch and a half (0.038 metre) to two inches (0.050 metre) in height at the flowering-time, produced to a height of three inches (0.075 metre) at the maturity of the capsule.

Capsule about an inch (0.025 metre) long, and a third of an inch (0.0084 metre) broad, bright green veined with purple.

Seed nearly spherical, one sixth of an inch (0.0042 metre) high, and one-eighth of an inch (0.0032 metre) broad, glabrous, of a rich red-brown colour; the chalaza, raphe, and prominent caruncle of the same colour as the body of the seed.

Fig. 1 March

CROCUS VERSICOLOR. *Gawl.*

C. fragrans, Haworth.

G. Maw del.

F. Huth Lith^r. Edin^r.

Crocus versicolor is abundant between long 5° 20′ and 7° 30′ east, and lat. 43° 10′ and 45° 30′ north, from the mountainous district east of the Rhone, to the western extremity of the French department of the Alpes Maritimes and the Italian frontier. It extends northwards as far as the mountains about Grenoble, and has a range of altitude from the sea level to four thousand feet. It occurs on Granmondo to the north-east of Mentone, at an altitude of three thousand feet; in ascending Monte Agel above Mentone, at a height of two thousand feet; near the sea-level at Cape St. Martin, west of Mentone; on Monte Aguglia, near Monaco; Monte Gros; Monte Vinagrié (Vinaigrier, Vinagrion), east of Nice; St. Rocco, Nice; Fréjus; Grasse; Toulon; Moriére, near Toulon; Cuculle near Rabon, Hautes Alpes; meadows near the castle above Embrun; Galegère above Embrun; Draguignan; Bois de Poste, above Esparron, Provence; upper end of the Gouthière valley; mountains of Vaucluse; and at Comboire, near Grenoble. The record of its occurrence in Dalmatia is probably erroneous, as it is not elsewhere transgressive beyond the compact and limited area it occupies in the south western Alps. *Crocus versicolor* is almost the only feathered species in which the markings on the outer surface of the inner whorl of segments are nearly similar to the markings on the outer segments, and the coating of buff on the outer surface of the outer segments of the other allied Italian species, does not occur in it. There are few species that present so great a variety of flower-colouring, ranging from white through lilac to deep purple; the flowers being either self-coloured, or externally marked to a greater or less degree with purple featherings and veinings: indeed, it is difficult to find two flowers precisely alike even in the same habitat.

C. versicolor was one of the few species known to the early cultivators; and from its free-flowering habit and variety of colouring was an old horticultural favourite. Sabine, in the year 1830, described, at p. 457 of the seventh volume of The Transactions of the Horticultural Society of London, eighteen named horticultural varieties. It is beyond the scope of this work to refer to them in detail.

REFERENCES TO PLATE XVI.

Fig. 1. Flowering-state, March, actual size.
Fig. 1. *a*, *b*, *c*, and *d*. Outer surface of segments, actual size.
Fig. 2. With matured leaves and capsule, July 16th, actual size.
Fig. 3. Diagrammatic dissection of scape, ovary, and spathes, actual size.
Fig. 4. Stamens and Pistil, magnified two-fold.
Fig. 5. Pollen Grain, magnified one hundred and fifty-fold.
Fig. 6. Stigmata, magnified six-fold.
Fig. 7. Section of leaf, magnified six-fold.
Fig. 8. Corm tunics, magnified two-fold: *e*, cap; *f*, main tunic; *g*, base of corm.
Fig. 9. Seed, magnified six-fold.

18. CROCUS MALYI.

Section: Involucrati; parallelo-fibrosi *(Herbert)*: Odontostigma; vernal *(Baker)*.

Crocus Malyi, Visiani, Fl. Dalmat. Suppl. p. 181; G. Maw, Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, p. 303; in The Garden, vol. xxi, No. 532, p. 67; and Hist. Crocus in Journ. Linn. Soc., Bot., vol. xix, p. 372.

Cormus $\frac{3}{4}$—1 poll. (0.019—0.025 metr.) latus nec tam altus; tunica fibris tenuibus parallelis, paullo supra reticulatis confecta. Vaginæ quam spatha breviores. Folia glabra, quam faux ad florationem breviora, $\frac{3}{16}$ poll. (0.005 metr.) lata, matura pedalia. Spatha diphylla foliacea, ferme ad faucem extensa. Perianthium. tuba flava; faux aurantiaca, barbata; segmenta alba, $1\frac{3}{4}$ poll. (0.044 metr.) longa. Antheræ aurantiacæ: filamenta aurantiaca duplicantes. Stylus ad apices antherarum fissus. Stigmata aurantiaca subramosa.

Corm oblate, three-quarters of an inch (0.019 metre) wide, and from a third of an inch (0.0084 metre) to half an inch (0.013 metre) high. *Tunic* of fine parallel fibres, a little reticulated upwards; the *Cap* produced into a bunch of fibrous points, half an inch (0.013 metre) above the summit of the corm. *Basal Tunic* of fine fibres, radiating from the centre of the bottom of the corm.

Sheathing Leaves six or seven, from half an inch (0.013 metre) to four inches (0.100 metre) in length, falling short of the proper spathe.

Proper Leaves four or five, just appearing with the flowers, and barely reaching to the throat at the flowering-time, produced at the maturity of the capsule to a length of fifteen inches (0.375 metre), glabrous, one-sixth to one-fifth of an inch (0.0042—0.0050 metre) wide; the keel concave, about a fourth the width of the blade, the lateral channels wide and open, containing three low ridges.

Basal Spathe two inches (0.050 metre) in length. *Proper Spathe* monophyllous or diphyllous, a second ligulate bract being occasionally present, three inches (0.075 metre) in length, foliaceous, reaching to the throat.

Perianth: Tube about three inches (0.075 metre) in length from the ovary to the throat, yellow. *Throat* bearded, orange. *Segments* ovato-lanceolate, an inch and a half (0.038 metre) to an inch and three-quarters (0.044 metre) in length, and five-eighths of an inch (0.016 metre) broad, white, orange towards the throat, and occasionally suffused externally with vinous-purple towards the throat.

Stamens seven-eighths of an inch (0.022 metre) high, falling short of the pistil; the *Anthers* orange, five-eighths of an inch (0.016 metre) long, and about twice as long as the orange filament. *Pollen Grain* papillose, orange, $\frac{1}{330}$ of an inch (0.00008 metre) in diameter.

Pistil an inch and a quarter (0.032 metre) in height; the *Style* dividing at the level of the summit of the anthers, and produced into a spreading mass of slightly-divided orange stigmata.

Scape two inches (0.050 metre) in height at the flowering-time.

Capsule three-quarters of an inch high and one-third of an inch broad, bearing an awn-like prolongation of the remains of the proper spathe.

Seed bright red ripening to brown, papillose, one-sixth of an inch long and one-ninth of an inch broad. The chalaza, raphe, and caruncle a little darker than the body of the seed.

Crocus Malyi was discovered by Herr Maly on Monte Vermaz and Monte Orjen ("In Montibus Vellebit," Visiani), above the Bocco de Cattaro Dalmatia, latitude 42° 20′ north, longitude 18° 30′ east, at an altitude, on Monte Orjen, of 7000 Austrian feet (7260 English feet). It was first described by Professor Visiani in the supplement to the *Flora Dalmatica*. It has the general aspect of *C. vernus;* but the bright golden throat, and corm tunic of parallel fibres, readily distinguish it from that species. It flowers in March under cultivation.

REFERENCES TO PLATE XVIII.

Fig. 1. Flowering-state, March 11—23, actual size; *a*, inner surface of segment.
Fig. 2. With matured leaves at fruiting-time, June 19th, actual size.
Fig. 3. Diagrammatic dissection of scape, ovary, and spathes, actual size.
Fig. 4. Stamens and Pistil, magnified two-fold.
Fig. 5. Pollen Grain, magnified one hundred and fifty-fold.
Fig. 6. Stigmata, magnified six-fold.
Fig. 7. Section of leaf, magnified six-fold.
Fig. 8. Corm tunics, magnified two-fold: *b*, main tunic; *c*, basal tunic.

Fig. 1, March 11-23rd.

Fig. 2, June 19th.

CROCUS MALYI, *Visiani.*

J. Maw del.

F. Huth, Lith. Edin.

Ajaccio, Corsica.

19. CROCUS MINIMUS.

Section: Involucrati; (subreticulati?) *(Herbert)*: Holostigma; vernal *(Baker)*.

The following references apply in common to *C. minimus*, De Cand., and *C. corsicus*, Maw; the two species not having been separated till the year 1878.

Crocus minimus (not *C. minimus* of Bot. Mag. tab. 2991, which is *C. biflorus*, Miller,) De Cand. in Lamk. and De Cand. Fl. France, iii, p. 243; Red. Lil. ii, tab. 81; Viv. Fl. Cors. Diag. p. 3; Gay in Féruss. Bull. Sc. Nat. xi, p. 350—370; and four drawings Bibl. J. D. Hooker; Rœm. and

Schult, Syst. 1, p. 367; Loisel, Fl. Gall. i, p. 27; Duby and De Cand. Bot. Gall. p. 453; Rchb. Ic. Crit. vol. x, tab. 941, fig. 1267; and Ic. Fl. Germ. vol. ix, p. 9, tab. 359, fig. 795; Salis. Fl. Od. Bot. Zeit. 1833, p. 490; Bertol. Fl. Ital i, p. 210; and Desc. Zaffer Ital., No. 5; Moris, Fl. Sardin. Elench. i, p. 45; Gren. and Godr. Fl. France, iii, p. 236; Parlat. Fl. Ital. iii, p. 229; Klatt Revis. Irid. in Linnæa, xxxiv, p. 681 and 720; Marsilly, Cat. Pl. Cors. No. 1315, p. 144; Baker, Rev. Sp. Crocus, in Gard. Chron. 1873, p. 424; in Bot. Mag. tab. 6176; List of Crocuses in Journ. R. Hort. Soc. Lond., new ser., vol. iv, 1877; and Syst. Iridac. in Journ. Linn. Soc., Bot., vol. xvi, p. 81; G. Maw in Gard. Chron. 1878, p. 367-8; Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, p. 303; in The Garden, vol. xxi, No. 532, p. 67; and Hist. Crocus in Journ. Linn. Soc., Bot., vol. xix, p. 372.

Crocus insularis, Gay in Féruss. Bull. Sc. Nat. xxv, p. 221 (321); and four drawings Bibl. J. D. Hooker; Herbert, Hist. Crocus, sp. 10, p. 15; from Journ. Hort. Soc. Lond. ii, p. 261.

Crocus nanus, De Cand. Syn. Gall. p. 168.

Cormus circiter $\frac{1}{2}$ poll. (0.013 metr.) latus, et altus; tunica sursum cartilaginea, ad basin in fibris parallelis planis fissa. Vaginæ quam spatha breviores. Folia glabra, angustissima, vix $\frac{1}{12}$ poll. (0.0021 metr.) lata, præ florationem visa, flores ad florationem superantia, matura 8—9 poll. Spatha diphylla. Perianthium: faux glabra, violacea; segmenta vix 1 poll. (0.025 metr.) longa, splendide violacea; exteriora extus ochrea, varie purpurea striata et signata. Antheræ pallide flavæ, filamentis albis subæquales. Stylus ad apices antherarum fissus. Stigmata gracilia flava (rarius aurantiaca) divisa, patentia, antheras superantia. Semina coccinea.

Corm pyriform, fully half an inch (0.013 metre) broad and high. *Tunic* a strong membrane, splitting up from the base into flat fibre-like divisions, which in the absence of a separate *Basal Tunic* are articulated to the base of the corm. *Cap* membranous, produced upwards into short coriaceous points.

Sheathing Leaves about three, from an inch (0.025 metre) to two and a half inches (0.063 metre) in length, falling short of the proper spathe, and including several scapes.

Proper Leaves from three to four, appearing before the flowers, and reaching above the level of the flowers at the flowering-time, produced at the maturity of the capsule to a length of eight or nine inches (0.200—0.225 metre), one-twelfth of an inch (0.0021 metre) wide, glabrous; the keel about half the width of the blade.

Basal Spathe from two to two and a half inches (0.050—0.063 metre) long, and enclosing one or more scapes. *Proper Spathe* diphyllous, the outer spathe tubular, the inner ligulate, exceeding the sheathing leaves, and reaching nearly to the throat.

Perianth: Tube about an inch and a half (0.038 metre) to two inches (0.050 metre) in length from the ovary to the throat. *Throat* unbearded, white or lilac. *Segments* from an inch (0.025 metre) to an inch and a quarter (0.032 metre) long, and a third of an inch (0.0084 metre) broad, deep rich purple; the outer surface of outer segments coated with buff, and feathered with dark purple markings, occasionally white, or self-coloured purple without markings.

Stamens about five-eighths of an inch (0.016 metre) high, shorter than the pistil; the *Anthers* one quarter of an inch (0.0063 metre) long, yellow, a little shorter than the white filament. *Pollen Grain* $\frac{1}{400}$ of an inch (0.00006 metre) in diameter, papillose, yellow.

Pistil about three-quarters of an inch (0.019 metre) high from the throat, exceeding the stamens; the *Style* dividing at the level of the summit of the anthers, and produced into spreading, slightly branched, yellow or pale orange, stigmata, which are always higher than the stamens.

Scape about an inch and a half (0.038 metre) high at the flowering-time, and shortly produced to a height of two inches (0.050 metre) at the maturity of the capsule.

Capsule oblong, about three-quarters of an inch (0.019 metre) high, and a quarter of an inch (0.0063 metre) broad.

Seed very small, nearly spherical, from one-fifteenth to one-twelfth of an inch (0.0017—0.0021 metre) in diameter, papillose, rich red-brown; the chalaza, raphe, and caruncle but slightly prominent, of the same colour as the body of the seed.

CROCUS MINIMUS, *D. C. in part.*

C. insularis, Gay. in part.

J. Maw del. P. Roth. Lith. Edin.

Up to the year 1878, *C. minimus* of De Candolle had been associated with the mountain Crocus of Corsica; I then described the latter as a distinct species under Vanucci's name of *corsicus*, which had been applied in common to both. Some uncertainty necessarily exists in the published records of habitats, as to which species is referred to. *C. minimus* seems to be generally distributed along the west of Corsica, as at Calvi; on the coast west of Ajaccio; Portigliolo, on the south side of the bay of Ajaccio; mountains near Ajaccio; at an elevation of from twelve hundred to one thousand nine hundred feet above La Chapelle des Grecs, north-west of Ajaccio; Col St. George, beyond Cauro, fifteen miles from Ajaccio; les Iles Sanguinaires, at the entrance of the Gulf of Ajaccio; Bonifacio; the island of Caprera, in the Straits of Bonifacio; and in the following localities in Sardinia: summit of Monte Limbardo (Limbara), fifteen hundred metres, April 15th.; San Pietro; Monte Gennargentu; Decimo and Iglesias. It ranges between 39° 20′ and 42° 35′ north latitude, and 8° 25′ to 9° 20′ east longitude. In Corsica it generally occurs at low elevations, and seems to be limited in its range to an altitude of about two thousand feet. In Sardinia it reaches higher elevations. The parallel fibre of the corm tunic, the red seed, the pale stigmata over-topping the anthers, and the much smaller and darker flower of *C. minimus* readily distinguish it from *C. corsicus*. It commences to flower at low elevations at the end of January, and continues flowering to March and April on the higher ground; in cultivation it rarely flowers in the open air before April. The exceptionally rich colour of the flowers makes it a pretty and attractive little plant.

REFERENCES TO PLATE XIX.

Fig. 1. Flowering-state, March and April, actual size.
Fig. 1. *a*, White variety from the Col St. George.
Fig. 2. *b*, Outer surface of outer segment; *c*, inner surface of outer segment; *d*, outer surface of inner segment; *e*, outer surface of outer segment of an unfeathered variety.
Fig. 3. With matured leaves and capsule, June 9th., actual size.
Fig. 4. Diagrammatic dissection of scape, ovary, and spathes, actual size.
Fig. 5. *f* and *g*, Stamens and Pistil, magnified two-fold.
Fig. 6. Pollen Grain, magnified one hundred and fifty-fold.
Fig. 7. Stigmata, magnified six-fold.
Fig. 8. Section of leaf, magnified twelve-fold.
Fig. 9. Corm tunic, magnified two-fold: *h*, main tunic; *i*, base of corm.
Fig. 10. Seed, magnified six-fold.

20. CROCUS BOISSIERI.

Section: Involucrati *(Herbert)*: Odontostigma; vernal *(Baker)*.

Crocus Boissieri, new species, G. Maw, Exsic. Herb. Boissier; Tchihatcheff, Cilicia, 1854; G. Maw, Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, p. 304; in The Garden, vol. xxi, No. 532, p. 67; and Hist. Crocus in Journ. Linn. Soc., Bot., vol. xix, p. 272; Boiss. Fl. Orient., vol. v, part 1, p. 99.

Cormus ignotus. Vaginæ dimidio spathæ æquantes. Folia circiter 4, 4 poll. (0.100 metr.) longa ad florationem, floribus subæquantia, glabra, $\frac{1}{6}$ poll. (0.0042 metr.) lata, carina ferme dimidio latitudinis laminæ æqualis, marginibus laminæ revolutis, in canaliculis lateralibus costis tribus depressis. Spatha basalis brevis, vix ad ovarium extensa. Spatha vera monophylla, quam faux $\frac{3}{4}$ poll. (0.019 metr.) brevior. Perianthium: tubus et faux alba, probabiliter glabra; segmenta alba, ovato-lanceolata, angustissima, circiter $1\frac{1}{4}$ poll. (0.032 metr.) longa, $\frac{1}{4}$ (0.0063 metr.) lata. Antheræ pallide aurantiacæ, vix $\frac{1}{3}$ poll. (0.0084 metr.) longæ; filamenta antheras duplicantia. Stylus ad basin antherarum fissus. Stigmata expansa, fimbriata, apicibus antherarum æquantia.

Corm unknown.

Sheathing Leaves about three, from half an inch (0.013 metre) to an inch and a half (0.038 metre) in length, and about half the height of the proper spathe.

Proper Leaves about four, four inches (0.100 metre) long at the flowering-time, and reaching nearly to the summit of the flowers, one-sixth of an inch (0.0042 metre) broad, glabrous; the keel nearly half the width of the blade, margins of blade revolute, the lateral channels containing three low ridges.

Basal Spathe about an inch and a quarter (0.032 metre) in length. *Proper Spathe* monophyllous, much exceeding the sheathing leaves, and reaching to within three-quarters of an inch (0.019 metre) of the throat.

Perianth: Tube about two and a half inches (0.063 metre) long from the ovary to the throat. *Throat* unbearded (?), white. *Segments* ovato-lanceolate, very narrow, about an inch and a quarter (0.032 metre) long, and a quarter of an inch (0.0063 metre) broad, pure white.

Stamens three-quarters of an inch (0.019 metre) high, equalling the pistil. *Anthers* orange, about a quarter of an inch (0.0063 metre) in length, and half the length of the glabrous filament.

Pistil three-quarters of an inch (0.019 metre) high from the throat; the *Style* dividing at the level of the base of the anthers, and produced into broad, sub-entire, erect, orange stigmata, reaching to the level of the summit of the anthers.

Scape at the flowering-time about an inch (0.025 metre) high.

Capsule and *Seed* unknown.

Crocus Boissieri is, as far as I can ascertain, only known from a single imperfect specimen in the herbarium of Monsieur Boissier, collected by the Russian traveller Tchihatcheff on the 30th of June, 1853, in latitude 36° 25′ north, longitude 34° 10′ east, near the Cave of Corycus (modern Korghoz) in Cilicia. The description and figure are therefore necessarily incomplete; and nothing is known about its corm or fruiting condition. There is no other species in the East to which it has any near affinity. In the character of its stigmata and spathes it approaches *C. vernus*. It is remarkable for its extremely narrow perianth segments; and for the great length of the filament, which is double that of the short anthers.

REFERENCES TO PLATE XX.

Fig. 1. Flowering-state, June 30th, actual size.
Fig. 2. Perianth segment, actual size.
Fig. 3. Diagrammatic dissection of scape, ovary, and spathes, actual size.
Fig. 4. Stamens and Pistil, magnified two-fold.
Fig. 5. Stigmata, magnified six-fold.
Fig. 6. Section of leaf, magnified two-fold.

Fig. 1, June 30th.

CROCUS BOISSIERI, *G. Maw.*

G Maw del

F Huth, Lith^r Edin^r

DIVISION I.—INVOLUCRATI, Continued.

Species with a basal spathe springing from the base of the scape.

Section II.—RETICULATI.

Species with a corm tunic of distinctly reticulated fibres.

Spring Flowering.—

21. C. corsicus.
22. etruscus.
23. montenegrinus.
24. banaticus.
25. Tommasinianus.
26. vernus.

Autumn Flowering.—

27. medius.
28. longiflorus.
29. sativus.
30. hadriaticus.

Corte, Corsica.

21. CROCUS CORSICUS.

Section: Involucrati; reticulati *(Herbert)*: Odontostigma? vernal *(Baker)*.

Crocus corsicus, G. Maw in Gard. Chron., new ser., 1878, p. 367-8; Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, 1881, p. 367; in The Garden, vol. xxi, No. 532, p. 67; and Hist. Crocus in Journ. Linn. Soc., Bot., vol. xix, p. 372.

Crocus corsicus, in part, Vanucci, Tabl. Top. Bast. 1838, including also *C. minimus*, De Cand.

C. minimus, var. B. corsicus, Gay in Féruss, Bull. Sc. Nat. xi, p. 370.

C. insularis, var. 1. *major*, Herbert, Hist. Crocus, sp. 10, p. 15; from Journ. Hort. Soc. Lond., vol. ii, p. 261; and drawing Lind. Libr. R. Hort. Soc. Lond.

(See also references to No. 19, *C. minimus*, De Cand., *C. insularis*, Gay, under which names *C. corsicus* is included.)

C. insularis, Herbert, in Bot. Reg. 1843, vol. xxix, tab. 21.

Cormus $\frac{3}{4}$ poll. latus (0.019 metr.); tunica fibro-membranacea, tenuiter reticulata. Vaginæ quam spatha breviores. Folia glabra, flori ad florationem æquantia, matura 8 poll. (0.200 metr.) longa, circiter $\frac{1}{8}$ poll. (0.0032 metr.) lata, canaliculi laterales 1-2 costati. Spatha monophylla. Perianthium: faux glabra, violacea; segmenta $1\frac{1}{2}$ poll. (0.038 metr.) longa, $\frac{1}{2}$ poll. (0.013 metr.) lata, splendide lilacina, concolora; exteriora extus ochrea, signis penniformibus purpureis. Antheræ pallide aurantiacæ, filamenta alba duplicantes. Stylus ad medias antheras fissus. Stigmata subulata coccinea, ramulosa fimbriata, apicibus antherarum æquantia. Semina pallide ochrea.

Corm from half an inch (0.013 metre) to three-quarters of an inch (0.019 metre) broad, and barely half an inch (0.013 metre) in height. *Tunic* of finely reticulated fibre on a membranous base; the base of the corm covered with parallel unbranched fibres continued downwards from the main tunic, in place of a separate basal tunic; the *Cap* reticulated, produced upwards into a few short fibres.

Sheathing Leaves three or four, from half an inch (0.013 metre) to two and a half inches (0.063 metre) in length, falling short of the proper spathe.

Proper Leaves three or four, appearing before or with the flowers, reaching to the level of the flowers at the flowering-time and produced to a length of about eight inches (0.200 metre) at the maturity of the capsule, one-tenth of an inch (0.0025 metre) broad, the keel about one-third the width of the blade, the lateral channels wide and open and containing one or two ridges.

Basal Spathe from an inch and three-quarters (0.044 metre) to two inches (0.050 metre) in length. *Proper Spathe* monophyllous, about two inches (0.050 metre) in length, reaching nearly to the throat.

Perianth: Tube from two, to two and a half inches (0.050—0.063 metre) long from the ovary to the throat. *Throat* unbearded, internally white or lilac. *Segments* broadly lanceolate, about an inch and a quarter (0.032 metre) long, and half an inch (0.013 metre) broad, pale purple; the outer surface of the outer segments coated with buff and feathered with purple markings.

Stamens equalling or exceeding pistil, about three-quarters of an inch (0.019 metre) high. *Anthers* yellow, half an inch (0.013 metre) long, and twice the length of the glabrous white filament. *Pollen Grains* papillose, orange, $\frac{1}{340}$ of an inch (0.00007 metre) in diameter.

Pistil about three-quarters of an inch (0.019 metre) high from the throat; the *Style* dividing at the level of the base or middle of the anthers and produced into broad, entire, or sub-entire, orange-scarlet stigmata which are generally below the level of the summit of the anthers.

Scape about an inch (0.025 metre) high at the flowering-time and produced to a height of about two inches (0.050 metre) at the maturity of the capsule.

Capsule oblong, about three-quarters of an inch (0.019 metre) high, and a quarter of an inch (0.0063 metre) broad, veined with purple.

Seed about one-sixth of an inch (0.0042 metre) long and one-tenth of an inch (0.0025 metre) broad, rich buff in colour; with prominent chalaza, raphe, and caruncle of a paler colour than the body of the seed and fringed with minute hairs.

Crocus corsicus, up to the year 1878 had been undistinguished from *C. minimus* of De Candolle; and some uncertainty necessarily exists as to which species is referred to in the published records of habitats. *C. corsicus* is an abundant plant in the mountain district of the northern half of Corsica, rarely occurring lower than two thousand feet, and reaching to an altitude of six thousand or seven thousand feet. It ranges from south to north, between 42° and 43° north latitude, and from west to east, between 8° 30′ and 9° 30′ east longitude; occurring on the watershed by the roadside between Ajaccio and Corte; on the mountains above Corte; on Monte Rotundo and Monte Pegno; on the mountains between Bastia and St. Florence; above Olette, near St. Florence; on the mountain range between Bastia and Cape Corso, and Torre del Seneca, Cape Corso. I have no record of its occurrence in the southern half of Corsica, where its substitute is *C. minimus*.

In the herbarium of Mons. Cosson, of Paris, there are, from Willkomm's Herbarium, three specimens of a Crocus which appear to be identical with this plant, labelled—*C. magontanus (= Cambessedesii)* from Binisarmeña, opposite Port Mahon, Minorca, collected by Señor Rodriguez, on the 17th. of December, 1872. Having referred one of these to Señor Rodriguez, and to Señor Carreras, of Mahon, they inform me that they have no recollection of collecting such a Crocus in Minorca. The remainder of Señor Rodriguez's specimens, and those in the Willkomm Herbarium at Coìmbra, and other herbaria, under similar labels, are without doubt *C. Cambessedesii (C. magontanus* of Rodriguez). In the spring of 1879, in company with the late Rev. Harpur Crewe, I visited Minorca in the hope of re-finding the plant; but a thorough search over the district of Binisarmeña failed to reward us, for we found no other Crocus than *Cambessedesii*. If any error has occurred in the misplacing of labels, the specimens must have been transposed when in Mons. Willkomm's possession; but he assures me that he possesses no other Corsican Crocus than *minimus*. The evidence of the occurrence of *C. corsicus* in Minorca is far from conclusive; but it is possible that Mons. Cosson's specimens may have been collected in Minorca, especially as several other Corsican plants occur in the island.

C. corsicus is readily distinguished from *C. minimus* by its larger and paler flowers; its finely reticulated corm tunic; its rich orange-scarlet pistil, which rarely exceeds the height of the anthers; and by its buff seed. The leaf-structure is also totally different. It is a much more robust plant than *Crocus minimus*. In its native habitats it commences to flower towards the end of January at the lower elevations, and continues in flower up to May towards the summits of the mountains; forming throughout the spring months a conspicuous feature in the Mountain Flora of the north of Corsica. In April, 1870, I observed it in the greatest profusion and beauty on the flanks of Monte Rotundo at an altitude of six thousand feet.

It grows and flowers freely in cultivation and is a valuable decorative plant for the spring garden.

REFERENCES TO PLATE XXI.

Fig. 1. Flowering-state, March 12th, actual size.
Fig. 2. *a*, Outer surface of outer segment; *b*, outer surface of inner segment, actual size.
Fig. 3. Fruiting-state, June 3rd, actual size.
Fig. 4. Diagrammatic dissection of scape, ovary, and spathes, actual size.
Fig. 5. Stamens and pistil, magnified two-fold.
Fig. 6. Pollen Grain, magnified one hundred and fifty-fold.
Fig. 7. *d*, *e*, Stigmata, magnified six-fold.
Fig. 8. Section of leaf, magnified twelve-fold.
Fig. 9. *f*, Main tunic; *g*, base of corm, magnified two-fold.
Fig. 10. Seed, magnified six-fold.

CROCUS CORSICUS, *Maw.*

C. insularis var. major, Herbert.

22. CROCUS ETRUSCUS.

Section: Involucrati; reticulati (*Herbert*): Holostigma; vernal (*Baker*).

Crocus etruscus, Parlatore, Fl. Ital., vol. iii, p. 228; Baker in Gard. Chron., new ser., 1876, p. 622-3; Syst. Iridac. in Journ. Linn. Soc., Bot., vol. xvi, p. 82: and in Bot. Mag. May, 1878, tab. 6362; G. Maw in The Garden, No. 228, p. 301, and vol. xxi, No. 532, p. 67; in Gard. Chron., new ser., 1878, p. 114; and 1879, p. 235; Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, p. 367; and Hist. Crocus in Journ. Linn. Soc., Bot., vol. xix, p. 372.

C. reticulatus, var. 3, *etruscus*, Baker, List Crocus. in Journ. R. Hort. Soc. Lond., new ser., vol. iv, 1877.

Cormus subsphæricus, paullo latior quam altior, $\frac{1}{2}$—$\frac{3}{4}$ poll. (0.013—0.019 metr.) latus; tunicæ fibri validi reticulati; tunica basalis discoidea, fibris radiatis acutis. Vaginæ quam spatha breviores. Folia glabra, fauci ad florationem æquantia, $\frac{3}{16}$—$\frac{1}{4}$ poll. (0.0050—0.0063 metr.) lata, carinæ angustæ marginibus ciliatis. Scapi 1—plures in spatha basali inclusi. Spatha vera monophylla. Perianthium: faux paullo barbata, flava; segmenta $1\frac{1}{2}$ poll. (0.038 metr.) longa, $\frac{1}{2}$ poll. (0.013 metr.) lata, lilacina; exteriora extus lactea varie purpureo-signata, rarius concolora. Antheræ aurantiacæ, quam filamenta glabra aurantiaca circiter duplo longiora. Stylus ad apices antherarum fissus. Stigmata brevia patentia aurantiaca, subintegra, antheras superantia. Semina globosa, cervina.

Corm from half an inch (0.013 metre) to three-quarters of an inch (0.019 metre) broad, a little broader than high. *Tunic* of strong reticulated fibre; the *Basal Tunic* of strong, occasionally branched fibres, radiating from a coriaceous disc.

Sheathing Leaves three or four, from half an inch (0.013 metre) to three inches (0.075 metre) in length, falling short of the proper spathe, and enclosing one or two scapes.

Proper Leaves glabrous, three or four, appearing with the flowers, reaching to the level of the throat at the flowering-time, and produced at the maturity of the capsule to a length of eight or nine inches (0.200—0.225 metre) one-quarter of an inch (0.0063 metre) broad, surface of blade deeply concave, with reflexed margins; the keel about one-fifth the width of the blade, deeply concave.

Basal Spathe two inches (0.050 metre) in length enclosing one or two scapes. *Proper Spathe* monophyllous, from two and a half to three inches (0.063—0.075 metre) in length, exceeding the sheathing leaves, and reaching to within an inch (0.025 metre) of the throat.

Perianth: Tube about three, or three and a half inches (0.075—0.088 metre) in length from the ovary to the throat. *Throat* slightly bearded, pale yellow. *Segments* from an inch and a half (0.038 metre) to an inch and three-quarters (0.044 metre) in length, and from half an inch (0.013 metre) to three-quarters of an inch (0.019 metre) broad, pale bluish lilac; the outer surface of the outer segments cream-colour and variously feathered and striped with purple.

Stamens three-quarters of an inch (0.019 metre) high; *Anthers* orange, half an inch (0.013 metre) long and twice the length of the glabrous orange *Filament*. *Pollen Grains* $\frac{1}{340}$ of an inch (0.00007 metre) in diameter, papillose, orange.

Pistil about an inch (0.025 metre) high, exceeding the anthers; the *Style* dividing at the level of the summit of the anthers and produced into entire spreading orange stigmata.

Scape barely an inch (0.025 metre) in height at the flowering-time and produced to a height of two or three inches (0.050—0.075 metre) at the maturity of the capsule.

Capsule barely an inch (0.025 metre) in length and three-eighths of an inch (0.010 metre) broad.

Seed nearly spherical, $\frac{3}{20}$ of an inch (0.0038 metre) in height, papillose, of a dull buff colour; the chalaza, raphe, and caruncle but slightly prominent and of the same colour as the body of the seed.

Crocus etruscus is a native of the Tuscan Maremma, near the west coast of Italy, latitude 43° 5′ north, longitude 11° 0′ east. It was discovered by Professor Parlatore on the 9th. of April, 1858 in oak woods by the side of the road in ascending the Salita del Filetto, six miles to the south-east of Massa Marittima, on the road to Pomarancie. For many years it was known only by the two or three specimens preserved in the general herbarium at Florence.

On March the 12th., 1876, in company with Sigñor S. Sommier of Florence, I had the pleasure of re-discovering the species, both in flower and fruit, in the habitat where it was first gathered by Professor Parlatore. We also observed it in a field by the roadside near a farm-house known as *Poggio ai Venti*, a mile and a half nearer Massa Marittima, and the country people told us that it occurs elsewhere in the Maremma.

C. etruscus is one of the group of vernal Italian Crocuses to which *C. Imperati* belongs; but its strong, wiry, reticulated corm tunic readily distinguishes it from any other allied species. It is a robust plant of easy cultivation, flowering freely in the open border in March; it also seeds abundantly, and a large number of seedlings raised at Benthall retain all the distinctive characters of the wild plant.

REFERENCES TO PLATE XXII.

Fig. 1. Flowering-state, March 20th, actual size; *a*, *b*, *c*, outer surface of outer segments; *d*, inner surface of segments, actual size.
Fig. 2. With matured leaves and capsule, May 23rd, actual size.
Fig. 3. Stigmata, magnified six-fold.
Fig. 4. Stamens and Pistil, magnified two-fold.
Fig. 5. Pollen Grain, magnified one hundred and fifty-fold.
Fig. 6. Diagrammatic dissection of scape, ovary, and spathes, actual size.
Fig. 7. Seed, magnified six-fold.
Fig. 8. Section of leaf, magnified six-fold.
Fig. 9. Ripe capsule, June 21st, actual size.
Fig. 10. Corm tunics, magnified two-fold; *e*, basal tunic; *f*, and *g*, main tunic.

CROCUS ETRUSCUS, *Parlatore.*

J. Maw, del. F. Huth, Lith. Edin.

Cattaro, Dalmatia.

23. CROCUS MONTENEGRINUS.

Section: Involucrati; reticulati *(Herbert)*: Holostigma; vernal *(Baker)*.

Crocus montenegrinus, Kerner, Exsic. in Vienna Herbarium; G. Maw, Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, p. 368; in The Garden, vol. xxi, No. 532, p. 67; and Hist. Crocus in Journ. Linn. Soc., Bot., vol. xix, p. 372.

Crocus appendiculatus, Kerner, Exsic. "nomen mutavi."

Cormus circiter ½ poll. (0.013 metr.) lata; tunica fibris dense reticulatis. Vaginæ quam spatha breviores. Folia 3-4, floribus subæquantia, circiter $\frac{1}{10}$ poll. (0.0025 metr.) lata, canaliculis lateralibus costatis. Spatha monophylla, fauci subæqualis. Perianthium: faux aurantiaca, glabra? segmenta lactea-alba, vix 1 poll. (0.025 metr.) longa. Antheræ aurantiacæ, dimidio filamenti aurantiaci æquantes, appendiculatæ, appendice stigmatoidea. Stylus prope faucem fissus. Stigmata integra late patentia, basim antherarum parum superantia.

Corm about half an inch (0.013 metre) broad and high. *Tunic* of closely reticulated fibres.

Sheathing Leaves about three, from half an inch (0.013 metre) to an inch and a half (0.038 metre) in height, falling short of the proper spathe.

Proper Leaves three or four, appearing with the flowers, and reaching to a length of three or four inches (0.075—0.100 metre) at the flowering-time, about one-tenth of an inch (0.0025 metre) wide, glabrous; the keel one-fifth the width of the blade, the lateral channels, containing two or three prominent ridges, wide and open.

Basal Spathe an inch (0.025 metre) long, reaching to the summit of the ovary. *Proper Spathe* monophyllous, an inch and a half (0.038 metre) long, exceeding the sheathing leaves and reaching nearly to the throat.

Perianth: Tube an inch and a quarter (0.032 metre) long from the ovary to the throat. *Throat* unbearded (?), yellow. *Segments* barely an inch (0.025 metre) long and a quarter of an inch (0.0063 metre) broad, creamy white, yellow towards the base.

Stamens about five-eighths of an inch (0.016 metre) high. *Anthers* about a quarter of an inch (0.0063 metre) long, orange, bearing at their extremity a short stigmatic appendage. *Filament* yellow, about twice the length of the anthers.

Pistil about three-eighths of an inch (0.010 metre) in height from the throat, falling short of the stamens; the *Style* dividing close to the throat and produced as entire spreading widely expanding orange stigmata, reaching a little above the base of the anthers.

Scape, at the flowering-time about three-quarters of an inch (0.019 metre) high.

Capsule and *Seed* unknown.

Crocus montenegrinus is a vernal species, and was discovered by Herr Maly in Mount Orgen, in Montenegro, latitude 42° to 43° north, and longitude 20° east. The stigmata resemble those of no other species: whether the stigmatic appendage at the extremities of the anthers is a constant character, or an occasional case of morphosis, I have not been able to ascertain; but as it suggested the name of *appendiculatus* to Dr. Kerner I presume it was present in all the examples collected by Herr Maly.

REFERENCES TO PLATE XXIII.

Fig. 1. Flowering-state, vernal, actual size.
Fig. 2. Diagrammatic dissection of scape, ovary, and spathes, actual size.
Fig. 3. Stamens and Pistil, magnified two-fold.
Fig. 4. Anther, magnified six-fold.
Fig. 5. Stigmata, magnified six-fold.
Fig. 6. Section of leaf, magnified six-fold.
Fig. 7. Corm tunic, magnified two-fold.

Fig. 4 × 6.

Fig. 7 × 6.

CROCUS MONTENEGRINUS, *Kerner, m. s.*

C. appendiculatus, Kerner, m. s.

G. Maw del. F. Huth Lith.r Edin.r

24. CROCUS BANATICUS.

Section: Subnudi *(Herbert)*: Holostigma; vernal *(Baker)*.

Crocus banaticus, (not *C. banaticus*, Gay, which is *C. iridiflorus*, Heuffel), Heuffel in Verh. Zoolog.-Bot, Gesell., p. 205; in Bot. Zeit. p. 255; in Œster Bot. Wochen. p. 222; and in Banat. p. 169; Rchb. Icon. Fl. Germ. ix, p. 10, tab. 361, fig. 800-1; Bluff Comp. Fl. Germ., ed. 2, ii, p. 746; Andrä in Bot. Zeit., 1856, p. 66; Körnicke in Bot. Zeit, 1856, p. 473; Klatt, Revis. Irid. in Linnæa xxxiv, p. 676; Schur., Fl. Transs. No. 3465, p. 652; Baker, Rev. Sp. Crocus in Gard. Chron. 1873, p. 434; List Crocus. in Journ. R. Hort. Soc. Lond., new ser., vol. iv, 1877; and Syst. Iridac. in Journ. Linn. Soc., Bot., xvi, p. 81; G. Maw, Synops. Genus Crocus in Gard. Chron., new ser., xvi, p. 368; in The Garden, vol. xxi, no. 532, p. 67; and Hist Crocus in Journ. Linn. Soc., Bot., vol. xix, p. 372.

C. vernus (not *C. vernus* of Alliono), Brug. no. 117.

C. Heuffelianus, Herbert Hist. Crocus, no. 25, p. 27; from Journ. Hort. Soc. Lond. ii, p. 273.

C. Heuffellii, Körnicke in Flora, 1856, ii, p. 476.

C. veluchensis, (not *C. veluchensis*, Herbert) of many Botanical Gardens and Herbaria; Schott in Bot. Zeit., 1851, p. 281; Schur. Sert. 1852, no. 2742, p. 73; and Fl. Transs. no. 3466; ? Baker in Gard. Chron. 1874, p. 542; and in Bot. Mag. tab. 6197.

C. Sieberi, var. *veluchensis*. ? Baker, Rev. Sp. Crocus in Gard. Chron. 1873, p. 542; ? and List Crocus, in Journ. R. Hort. Soc. Lond., new ser., vol. iv, 1877; and Syst. Iridac. in Journ. Linn. Soc., Bot., xvi, p. 82.

C. vittatus, Schlosser in Schur., Fl. Transs., p. 652.

C. uniflorus, Schur., Verh. Sieber. ver. 1852, p. 90.

C. exignus, Schur., Fl. Transs. no. 3467, p. 652.

C. banaticus, var. a. *versicolor*, b. *concolor*, c. *pictus*, d. *niveus*, Schur., Fl. Transs., no. 3465, p. 652: var. *albiflorus* (not *albiflorus*, Kit. which is a var. of *C. vernus*) Schur., Herb. Transs.

Cormus parvus ferme sphæroideus, circiter $\frac{1}{2}$ poll. (0.013 metr.) latus; tunica fibris tenuibus, reticulatis confecta. Vaginæ quam spatha breviores. Folia ad florationem intra vaginas visa, matura pedalia (0.300 metr.) vel ultra, glabra, $\frac{3}{8}$ poll. (0.010 metr.) lata, carina angusta, lamina lata, canaliculis lateralibus latis. Spatha monophylla. Perianthium: tubus purpureus; faux purpurea haud barbata; segmenta splendide purpurea, macula obscuriore purpurea prope apicem; segmenta interiora pallidiora, circiter $1\frac{1}{2}$ poll. (0.038 metr.) longa, $\frac{1}{2}$ poll. (0.013 metr.) lata, apice obtusa vel emarginata. Antheræ aurantiacæ, quam filamenta alba paullo longiores. Stylus ad apices antherarum fissus. Stigmata aurantiaca fimbriata, congesta, antheras superantia. Semina globosa, obscure cervina.

Corm small, nearly spherical, stoloniferous, from half an inch (0.013 metre) to two-thirds of an inch (0.017 metre) broad and from a third of an inch (0.0084 metre) to half an inch (0.013 metre) high. *Tunic* of delicately reticulated fibre, produced upwards into a bunch of short pointed fibres. The *Basal Tunic* of fine radiating fibres covers the bottom of the corm.

Sheathing leaves about four, from half an inch (0.013 metre) to three inches (0.075 metre) in length, shorter than the proper spathe.

Proper Leaves about three, just appearing above the sheathing-leaves at the flowering-time and produced to a length of fifteen inches (0.375 metre) at the maturity of the capsule, three-eighths of an inch (0.010 metre) broad, glabrous, the keel one-fifth of the width of the blade, the lateral channels wide and open.

Basal Spathe about an inch and a half (0.038 metre) in length, falling short of the ovary. *Proper Spathe* monophyllous, about two and a half inches (0.063 metre) long and reaching to within half an inch (0.013 metre) of the throat.

Perianth: Tube violet, about three inches (0.075 metre) in length from the ovary to the throat. *Throat* unbearded, white internally. *Segments* an inch and a half (0.038 metre) in length and five-eighths of an inch (0.016 metre) broad; the inner segments emarginate, rich bright purple, with darker purple markings near the summit; the inner segments paler in colour than the outer, varying in colour to white, or variegated with purple and white.

Stamens shorter than the pistil, about an inch (0.025 metre) high; the *Anthers* orange, five-eighths of an inch (0.016 metre) long, and a little longer than the white glabrous *Filament*. *Pollen Grain* larger than in any other species $\frac{1}{270}$ of an inch (0.00009 metre) in diameter, papillose, orange.

Pistil about an inch and a quarter (0.032 metre) in height; the *Style* dividing at the level of the summit of the anthers and produced into a compact mass of spreading sub-entire orange stigmata.

Scape an inch and a half (0.038 metre) high at the flowering-time and produced to a height of three or four inches (0.075—0.100 metre) at the maturity of the capsule.

Capsule about three-quarters of an inch (0.019 metre) long and five-sixteenths of an inch (0.008 metre) broad.

Seed nearly spherical, one-eighth of an inch (0.0032 metre) in diameter, papillose, fawn-coloured; the chalaza, raphe and caruncle of the same colour as the body of the seed.

Crocus banaticus is a native of woods, thickets, and alpine pastures up to an altitude of six thousand feet; between latitude 44° 30′ and 49° 0′ north, and longitude 16° 0′ and 29° 30′ east, from Sclavonia, throughout southern Hungary, and Transylvania, to western Podolia. In Sclavonia it has been recorded from Mount Točag, Fvečevo, Zwečewo, and Agram; woods and hills about Kreuz, (Kreutz, Creutz) in Croatia. The De Candolle Herbarium at Geneva contains specimens from Bosnia. It is abundant in Hungary and Transylvania, as in grassy places near Skokarak, and about Kapellenberg, at an altitude of two thousand feet; sub-alpine meadows South Banat; thickets and damp woods, and wooded mountains, Northern Banat; flowering in February and March; on the Fogaraser, Arpaser, and Kergersorer Mountains; on the Kuhorn, and at Korondseys, near Rodna (Radna), at altitudes of from five thousand to six thousand feet; in the beech forests at Salomenberge and Waldwiesen, near Csiklova, flowering from February to April; in the woods at Szaldobagy, near Grosswardein, May 4th., Lesnyck (Lesnek); Mehadia; and Koshair, near Orsova (*Thermes Hercules*); summit of Mount Csucsula Vecse; in woods near

CROCUS BANATICUS, *Heuffel.*

C. Heuffellii Kornicke. C. vittatus, Schlosser. C. exiguus, Schur.

G Maw del. F Huth, Lith^r Edin^r

Magnum Varadinum; near Bischoffsbad, March; near the village of Ganos; at Gauts; on sub-alpine hills Gotzenberg; at Preschbe and Mumma; at Dées in The Marmaros; on chalk hills about Kronstadt. Mons. Maximowicz, to whom I am indebted for much information about the limits of the distribution of the genus in southern Russia, informs me that *C. banaticus* extends eastward into Russian territory, and has been found at Kamenetz (Kaminietz), latitude 48° 40′ north, longitude 26° 30′ east, and at Nestouta,near Balta, in Podolia, latitude 47° 48′ north, longitude 29° 30′ east.

There are few species of Crocus to which so many names have been applied as to *C. banaticus* and of the nine names under which it has been known three are the result of mistaken identification. The most common error has been the confounding of *C. banaticus* with *C. veluchensis* of Herbert; the latter is a native of Greece and has no basal spathe, but a diphyllous proper spathe. *C. banaticus* is widely cultivated as *C. veluchensis* and is known under the latter name in many of the continental gardens. I believe that the figure, tab. 6197, in the Botanical Magazine under the name of *veluchensis*, represents *C. banaticus;* the plant from which the figure was drawn having been received by the late Rev. H. H. Crewe, through Herr Max Leichtlin, from the Berlin Botanical Garden, where it has been grown under the name of *C. veluchensis*. *C. banaticus* is a valuable plant for garden decoration; it is of robust habit and flowers freely in March, in the cold frame and open border.

My figure was drawn from plants from a wild source, kindly obtained for me by Cardinal Haynald, Archbishop of Kalossa, in Hungary.

REFERENCES TO PLATE XXIV.

Fig. 1. Flowering-state, Feb. 28th. actual size.
Fig. 2. With matured leaves and capsule, June 11th, actual size.
Fig. 3. Diagrammatic dissection of scape, ovary, and spathes, actual size.
Fig. 4. Stamens and Pistil, magnified two-fold.
Fig. 5. Pollen Grain, magnified one hundred and fifty-fold.
Fig. 6. Stigmata, magnified six-fold.
Fig. 7. Section of leaf, magnified six-fold.
Fig. 8. Corm tunics, magnified two-fold: *a*, cap; *b*, main tunic; *c*, basal tunic.
Fig. 9. Seed, magnified six-fold.

25. CROCUS TOMMASINIANUS.

Section: Subnudi *(Herbert)*: Holostigma; vernal *(Baker)*.

Crocus Tommasinianus, Herbert, Hist. Crocus, Sp. 26, p. 27; from Journ. Hort, Soc. Lond. ii, p. 273; G. Maw, Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, p. 368; in The Garden, vol. xxi, No. 532, p. 67; and Hist. Crocus in Journ. Linn. Soc., Bot., vol. xix, p. 372.

C. vernus, var. 4, *Tommasinianus*, Baker, Rev. Sp. Crocus in Gard. Chron. 1873, p. 542; List. Crocus in Journ. R. Hort. Soc. Lond., new ser., vol. iv, 1877; and Syst. Iridac. in Journ. Linn. Soc., Bot., xvi, p. 81.

C. serbicus, Kerner, Exsic.

? *C. crestensis*, Eugene.

Cormus globosus, vix ½ poll. (0.013 metr.) latus; tunicæ fibri tenues reticulati. Vaginæ quam spatha breviores. Folia circiter ½ poll. (0.013 metr.) lata, glabra, visa ad florationem, matura 9-10 poll. (0.225—0.300 metr.) longa. Spatha monophylla, fauci ferme æquans. Perianthium: faux alba, haud barbata; segmenta 1-poll. (0.025 metr.) vel 1½ poll. (0.038 metr.) longa, pallide sapphirina-lavandulacea, et (fide Herberti,) nonnunquam macula obscuriore ad apices. Antheræ pallide aurantiacæ, parum quam filamentum album sub-glandulosum longiores. Stylus ad apices antherarum fissus. Stigmata congesta, subintegra aurantiaca. Capsula purpurea. Semina splendide kermesina, matura tandem brunnea.

Corm nearly spherical, barely half an inch (0.013 metre) in diameter. *Tunic* of finely reticulated fibres on a membranous base; the *Cap* produced into a few short points. The *Basal Tunic* of radiating unbranched fibres.

Sheathing Leaves about four, from half an inch (0.013 metre) to three inches (0.075 metre) in length, shorter than the proper spathe.

Proper Leaves from three to five, just appearing with the flowers, reaching to the level of the proper spathe at the flowering-time and produced to a length of nine or ten inches (0.225—0.250 metre) at the maturity of the capsule, glabrous, one-eighth of an inch (0.0032 metre) broad; the keel one-third the width of the blade, concave; the lateral channels wide and open.

Basal Spathe about an inch (0.025 metre) in length. *Proper Spathe* two inches (0.050 metre) long, monophyllous, exceeding the sheathing leaves and reaching to within half an inch (0.013 metre) of the throat.

Perianth: Throat white, unbearded. *Tube* from three, to three and and a half inches (0.075—0.088 metre) in length from the ovary to the throat. *Segments* from an inch (0.025 metre) to an inch and a half (0.038 metre) long and from a third of an inch (0.0084 metre) to half an inch (0.013 metre) broad, pale sapphire-lavender; said, by Herbert, to be occasionally marked with a darker blotch near the summit.

Stamens nearly three-quarters of an inch (0.019 metre) high; the *Anthers* orange, a little longer than the white *Filament*. *Pollen Grains* $\frac{1}{370}$ of an inch (0.00007 metre) in diameter, yellow.

Pistil fully three-quarters of an inch (0.019 metre) high, slightly exceeding the stamens; the *Style* dividing at the level of the summit of the anthers and produced into a compact mass of sub-entire orange stigmata.

Scape an inch and a half (0.038 metre) in length at the flowering-time, produced to a length of two or three inches (0.050—0.075 metre) at the maturity of the capsule.

Capsule three-quarters of an inch (0.019 metre) long, purple.

Seed one-tenth of an inch (0.0025 metre) in diameter, bright carmine, ripening to brown; chalaza, raphe and caruncle prominent, of the same colour as the body of the seed.

Crocus Tommasinianus is distributed east of the Adriatic, between latitude 42° 0′ and 43° 30′ north, and longitude 16° 0′ and 21° 0′ east, in Dalmatia, Servia; and probably also in Bosnia. It has been recorded from Scagliari; Monte Vermaz; and the slopes of Sella, above Cattaro, the Triglau; Mossor near Clissa, and other places in the neighbourhood of Spalatro, and Mount Biscovo in Dalmatia. The specimens in Dr. Kerner's Herbarium, under the name of *C. serbicus*, forming the subject of Plate XXV, fig. i, came from meadows on Mount Kopoanic (Kopaonic), in the south of Servia. It is nearly allied to *C. vernus*, but its glabrous throat and some other characters distinguish it from that species. Herbert is in error in stating that the "involucre" is absent, as all the specimens I have examined have a basal spathe. I was favoured by the late Mons. Tommasini with a liberal supply of roots from Dalmatia; these have flowered freely with me in the open border and produced seed. It is a robust and highly ornamental species, flowering a little latter than *C. vernus*.

REFERENCES TO PLATE XXV.

Fig. 1. Flowering-state, March, actual size, from specimens in the herbarium of Dr. Kerner under the name of *C. serbicus* from Mount Kopoanic Servia.
Fig. 2. Flower, actual size, produced in March from roots obtained at Scagliara, near Cattaro, in Dalmatia.
Fig. 3. Fruiting-state, May 14th, actual size, from roots obtained at Scagliari, near Cattaro, in Dalmatia.
Fig. 4. Diagrammatic dissection of scape, ovary, and spathes, actual size.
Fig. 5. *a*, and *b*, Stamens and Pistil, magnified two-fold.
Fig. 6. Pollen Grain, magnified one hundred and fifty-fold.
Fig. 7. Stigmata, magnified six-fold.
Figs. 8 & 9. Sections of leaf, magnified six-fold.
Fig. 10. Corm tunic, magnified two-fold: *c*, cap; *d*, main tunic; *e*, basal tunic.
Fig. 11. Seed, magnified six-fold: *f*, nearly ripe seed; *g*, ripe seed.

Fig. 3, May 14th

CROCUS TOMMASINIANUS, *Herbert.*

C. Serbicus, Kerner.

G. Maw del. F Huth, Lith^r Edin^r

The Rhone Glacier.

26. CROCUS VERNUS.

Section: Involucrati; reticulati *(Herbert)*: Holostigma; vernal *(Baker)*.

Crocus vernus (not *C. vernus* of Linnæus and of Curtis, which is *C. aureus*,) Allione, Fl. Pedem. vol. 1, No. 309, p. 84; Jacq. Fl. Aust. v, tab. 36; Eng. Bot. tab. 344, ed. 3, tab. 1499; Red. Lil. vol. v, 266; Bot. Mag. tab. 860, and tab. 2240: Bot. Reg. tab. 1416, and tab. 1440; Fl. Dan. 12, 2042; Haworth in Trans. Hort. Soc. Lond. i, p. 133; Wahl. Fl. Carpat. p. 12; Hayne Arzneigewächse, vi., tab. 26; Moretti, Notiz. Fl. Vicent. p. 4; Pollini, Fl. Veron. i, p. 46, iii. app., p. 768; Tenore,

Fl. Med. Univers.; Mem. Croc. Fl. Nap. tab. 1; and Fl. Nap. 205; Gay in Féruss. Bull. Soc. Nat. xi, 348—355; and several drawings Bibl. J. D. Hooker; Benth., Cat. Pl. Pyr., p. 73; Ker, Irid. Gen. p. 73; Sabine in Trans. Hort. Soc. Lond. vii, tab. ii, figs. 11 to 19 (Garden varieties); Rchb. Fl. Germ. Excurs., p. 85, No. 585; Ic. Crit. x. tab. 929—934, fig. 1250—1254; Exot. tab. 22; and Ic. Fl. Germ. ix, p. 8, pl. 355, fig. 786; W. Koch, Synops. Fl. Germ. et Helv., ed. 2, p. 804; Dietrich Fl. Boruss, i, p. 31; Nees, Gen. Plant. Fl. Germ. iii, 10; Herbert, Hist. Crocus, sp. 24, p. 25; from Journ. Hort. Soc. Lond. ii, p. 271; and drawing Lindl. Libr., R. Hort. Soc. Lond.; Sturm Deutsch Fl. vi, 22, and vii, 27; Gard. Chron. 1854, p. 168; Hook. and Arn. Br. Fl. ed. 7, p. 440; Bab. Man. Brit. Bot. ed. 4, p. 325; Philippe, Fl. Pyr. vol. ii, p. 344; Willk. and Lange, Prod. Fl. Hisp., vol. i, p. 146; Klatt, Revis. Irid. in Linnæa, xxxiv, pp. 629 and 719; Gren. and Godr. Fl. France, vol. iii, p. 236; Parlat. Fl. Ital., vol. iii, p. 223; Bouché Gattung Crocus in Linnæa, vol. i, p. 231; Schur., Fl. Transs., No. 3464, p. 652; Oudemanns, Flora van Nederland, ed. 1862, iii, p. 156; Ardoino, Fl. Alp. Marit., p. 364; H. Sturm, Tratt. Œstr., tab. iii; Baker, Rev. Sp. Crocus in Gard. Chron. 1873, p. 542; List Crocus in Journ. R. Hort. Soc. Lond., new ser., vol. iv; and Syst. Iridac. in Journ. Linn. Soc., Bot., xvi, p. 81; G. Maw, Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, p. 368; in The Garden, Feb. 28th., 1880, p. 197, vol. xxi, No. 532, p. 67; and Hist. Crocus in Journ. Linn. Soc., Bot., vol. xix. p. 372.

C. sativus, (not *C. sativus*, Red., Lil. tab. 173) var. *vernus*, Linn. Sp. Plant, ed. i, sp. 50, p. 36; ed. ii, p. 36.

C. sativus (not *C. sativus*, Red., Lil. tab. 173) Scop. Fl. Carniol.

C. officinalis sylvestries, Huds. Fl. Angl. i, p. 13.

C. multiflorus, Schur.

Var. 1. *siculus*. *C. siculus*, Tineo in Guss. Prod. Fl. Sic. Supp. p. 7; Guss. Fl. Sic. Syn. vol. i, p. 32. *C. vernus*, var. *siculus*, Baker, Rev. Sp. Crocus in Gard. Chron. 1873, p. 542; List Crocus in Journ. R. Hort. Soc. Lond., new ser., vol. iv, 1877; and Syst. Iridac. in Journ. Linn. Soc., Bot., vol. xvi, p. 81; G. Maw, Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, p. 368; in The Garden, vol. xxi, No. 532, p. 67. *C. minimus*, Cesati.

Var. 2. *albiflorus*, *C. albiflorus*, Kit. in Schult. Œster Fl. 1. p. 110; Rchb. Ic. Crit., fig. 1255; Gay in Féruss. Bull. Sc. Nat. xi, p. 349; and drawing Bibl. J. D. Hooker. *C. vernus*, var. *albiflorus*, Baker (including also var. *siculus*,) Rev. Sp. Crocus in Gard. Chron. 1873, p. 542; List Crocus in Journ. R. Hort. Soc. Lond., new ser., vol. iv, 1877; and Syst. Iridac. in Journ. Linn. Soc., Bot., vol. xvi, p. 81; G. Maw, Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, p. 368; and in The Garden, vol. xxi, No. 532, p. 67. *C. albifrons*, Kit., Rchb. Ic. Fl. Germ., vol. ix, Plate cccIv, fig. 787. *C. parviflorus*, (not *C. parviflorus*, Baker,) Rchb.

C. montanus, Hoppe.

Cormus circiter $\frac{3}{4}$ poll. (0.019 metr.), parum latior quam altus. Tunicæ fibri tenui reticulati. Vaginæ quam spatha breviores. Folia ad florationem visa, $\frac{1}{4}$ poll. (0.0063 metr.) ferme glabra, carina angustissima, canaliculi laterales lati et aperti sine costis. Spatha monophylla, fauci ferme æquans. Perianthium: faux alba vel lilacina, nunquam flava, semper barbata: segmenta longitudine et colore variantia, 1-2 poll. (0.025—0.50 metr.) longa, alba vel purpurea, varie striata et variegata, signa interiora sæpius ab exterioribus diversa; segmenta interiora atque exteriora plerumque similia, exteriora rarius extus ochrea. Antheræ insigniter flavæ, filamentum album subglandulosum bis superantes. Stylus parum infra apices antherarum fissus. Stigmata aurantiaca, rarius pallide ochroleuca, subintegra late congesta, in forma typica antheras superantia, in varietatibus *albiflorus* et *siculus* breviora. Semina globosa, rufescenti-cervina.

Corm oblate, in the wild state from half an inch (0.013 metre) to three-quarters of an inch (0.019 metre) broad, and from three-eighths of an inch (0.010 metre) to half an inch (0.013 metre) high; under

cultivation much larger. *Tunic* finely reticulated; the *Basal Tunic* of unbranched radiating fibres, covering the lower half of the corm.

Sheathing Leaves about four, shorter than the proper spathe, from half an inch (0.013 metre) to three inches (0.075 metre) in length.

Proper Leaves three or four, appearing with and reaching to the level of the flowers at the flowering-time; produced at the maturity of the capsule to a length of twelve or fourteen inches (0.300—0.350 metre), one-third of an inch (0.0084 metre) wide, glabrous, the keel concave, one-fifth the width of the blade, the lateral channels broad and open.

Basal Spathe about two inches (0.050 metre) long. *Proper Spathe* monophyllous, three inches (0.075 metre) long, reaching to within an inch (0.025 metre) of the throat, foliaceous at the extremity.

Perianth: Tube about three and a half inches (0.088 metre) in length from the ovary to the throat. *Throat* bearded, white internally. *Segments* from half an inch (0.013 metre) to two inches (0.050 metre) in length and from one-third of an inch (0.0084 metre) to two-thirds of an inch (0.016 metre) broad, very various in colour and markings, self-coloured ranging from pure white to deep purple and variously feathered and striped, the markings of the inner surface differing from those on the outer surface of the segments.

Stamens about an inch (0.025 metre), high in the type form a little shorter than the pistil, but occasionally much exceeding the pistil. *Anthers* orange, three-quarters of an inch (0.019 metre) long, and about three times the length of the white, glabrous *Filament*. *Pollen Grains* papillose, orange, $\frac{1}{360}$ of an inch (0.00007 metre) in diameter.

Pistil from three-eighths of an inch (0.010 metre) to an inch and a quarter (0.032 metre) high, slightly exceeding, or falling short of the stamens; the *Style* dividing below the level of the summit of the anthers and produced into a compact mass of fringed stigmata, which are generally orange, occasionally pale cream-colour.

Scape from an inch (0.025 metre) to an inch and a half (0.038 metre) in length at the flowering-time, produced to a length of three or four inches (0.075—0.100 metre) at the maturity of the capsule.

Capsule from three-quarters of an inch (0.019 metre) to an inch (0.025 metre) in height.

Seed nearly spherical, from one-tenth to one-eighth of an inch (0.0025—0.0032 metre) in diameter, of a dull fawn-colour; the chalaza, raphe and caruncle of the same colour as the body of the seed.

The geographical distribution of *Crocus vernus* presents some peculiar features. With the exception of *C. biflorus* and *C. sativus*, it has a wider range of longitude than any other species, extending from the Central Pyrenees, at the longitude of Greenwich, as far east as the Carpathians, longitude 23° east. Its wide ranging in longitude is accompanied by a range in latitude greater than in any other species, viz: from Sicily, latitude 37° 30′ north, to the Carpathians, latitude 49° north. Its wide range of latitude is, however, confined to the eastern end of the area of distribution; and the district it occupies appears when mapped out as a wedge-shaped space, increasing in width to its eastern limits.

Gavarnie in the Pyrenees, on the longitude of Greenwich, is the most western point from which it has been recorded; it occurs also on the Spanish side of the Pyrenees in Catalonia, and at Castenaise and The Val d'Arras in Aragon; it also extends for two and a half degrees along the Central and Eastern Pyrenees in the following localities:—the Cirque de Gavarnie; Heas; Capadur, in the Tourmalet;

Arize; Anéon, near Luchon; and at the Port de Venasque; also on the Canigou, longitude 2° 35′ east, near the eastern end of the Pyrenees.

The same narrow belt of distribution, nowhere more than a degree and a half wide in latitude, continues to the Rhone through Southern France, in the Cantal, Lozère, the Haute Loir, on Mount Mezenc; at Vals in the Ardeche, and at Lanujol and Dourlises in the Gard.

East of the Rhone the latitude of its distribution widens, and it occurs generally in the Alps of Dauphinè, and the Pine region of the Jura: also in the Maritime Alps, on the Col de Tenda, and in the Forest of Maïris; but in this district it does not approach the coast line, where *C. versicolor* seems to replace it. It is extremely abundant on Mont Cenis, where it occurs in endless variety of colouring and marking, up to an altitude of about seven thousand feet. It is generally distributed throughout the Swiss Alps, on Mount Pilatus, the Wengern Alp, Mürren, above Zermatt, etc.; also in the Tyrol, Carinthia, the Bavarian Alps, Southern Austria, in the Valley of the Erlaf and as far north as Zavelstein in Wurtemberg. It extends to the north-east as far as the Carpathians, where Wahlenberg, in his *Flora Carpatica*, records its occurrence in sub-alpine meadows near Langewald, Kalkgrund, Djumbier, etc. It is said to be found in Istria, and in Dalmatia it occurs up to a height of four thousand feet, at Koziah and Markesina Greda. In Carniola it occurs on Monte Wanas at an altitude of four thousand six hundred feet; also in the neighbourhood of Trieste, where at Opsina (Opschina), at an altitude of nine hundred feet, the diminutive variety, *albiflorus* of Gay, is abundant, and it is also said to extend up to an altitude of three thousand feet. Herbert records a variety from the Steppes north of Odessa, but this Trautvetter thinks is an error; and there is no authentic record of its occurrence further east than the Carpathians, longitude 23° east. The records of its occurrence in Bosnia and Servia may refer to the nearly allied species, *C. Tommasinianus* of Herbert, though it is not improbable that *C. vernus* also grows there.

In Italy it is generally and widely distributed, at both high and low elevations, from the sub-alpine districts of Piedmont and Lombardy, throughout the Apennines to Sicily. It has been recorded from the Eastern Riviera; from Oldenico, near Vercelli in Piedmont; from Tuscany, at Pratolino and Monte Senario near Florence; also from the Pontifical States. The large purple variety which grows abundantly on the upper terraces of the Botanical Garden at Rome has all the appearance of being indigenous. In the Neapolitan States it occurs at Frasso, near Caserto; and on Monte Morone, Monte Sirrente, Monte Tittone, and Monte Spenta in the Abruzzi; at Castelgrande in the Basilicata, and on Monte Pollino in Calabria.

In Sicily the diminutive form, *C. siculus* of Tineo, occurs on the mountains in the north of the island; on the Madonna Serra del Soglio, Monte Soro, at Cacca-

cibeddi, in sunny places in the woods of Cannata on Mount Etna, Monte Tessoro, and on calcareous rocks above Castelbuono at an altitude of between three and four thousand feet, flowering early in April.

There are many places in the north of Europe where *C. vernus* occurs in an apparently wild state; but looking at the well-defined boundary of its wild area, and at the fact that for at least three centuries *C. vernus* has been a popular garden plant, it is probable that its occurrence in England and other parts of northern Europe, is the result of escape from cultivation.

In England it has become naturalized at Mendham in Suffolk; and at Harlaston on the southern borders of Norfolk. It is abundant in the meadow below the old garden of Swarthmoor Hall Lancashire. It has been found near Leeds; by the side of the Trent south of Nottingham (Sabine); in Brookman's Park, Hertfordshire (Sabine); and near Hornsea and Colney Hatch in Middlesex.

In Ireland it occurs apparently wild near the old castle Dunganstown County Wicklow; and at Limavady County Derry.

It was found at Aarstad near Bergen, Norway, by Dr. Blytt, on the 18th. of April, 1848.

In the Netherlands it grows at Haren, near Groningen, where the blue and white forms are intermixed.

Professor Oudemans, in his *Flora Nederland* (vol. iii, p. 156), records its occurrence in the wood at Middlehoost and other parts of the Hague; and Gaspard Pelletier wrote as long ago as 1610 of its being then wild in the Netherlands.

Crocus vernus is the only Central European species which approaches the Spanish area, within which a set of species occurs distinct from the species of Central Europe.

There are few species which present such wide variations both in stature and colouring, or in which the varieties are so irregularly distributed in relation to locality and altitude. As a rule *C. vernus* is inherently variable; in most of its habitats it is difficult to find two individuals precisely similar, the varieties ranging from pure white to deep purple, many with intermediate variations of colour and markings, being intermixed. This is the case at Pratolino, near Florence, on Mont Cenis, and on other parts of the Alps. In the Apennines, and in Dalmatia, a large purple form, var. *neapolitanus* of Herbert, occurs, and it is the exception to find white or other varieties intermixed.

Again, as regards stature, the large and small forms are found at both high and low elevations. The variety *siculus* of Tineo, with segments barely half an inch long, is found on the Sicilian mountains; and the nearly allied variety *albiflorus* of Gay, at a comparatively low level on the limestone plateau above Trieste. The varieties found on Mount Cenis, at an altitude of from six thousand to seven thou-

sand feet, are below the average size and smaller than the purple form of the Apennines. The variety found on Monte Senario, above Florence, is exceptionally large.

The length of the pistil is also very variable, or rather there are two forms of pistil: in the small varieties, *siculus* and *albiflorus*, the stigma does not reach above the level of the middle of the anther; in the larger and normal forms the level of the stigma is generally a little higher than the level of the summit of the anther; but this is not invariable, as some of the larger forms have a short pistil. The colour of the pistil is normally orange, but in the variety *leucostigma* it is of a pale straw-colour.

Crocus vernus has been a popular garden plant for three hundred years at least. Although William Turner, in his work on *The Names of Herbes*, published in 1548, does not specifically distinguish *C. vernus* from other Crocuses, it was probably one of those then known; Gerard, fifty years later, figured and described a number of varieties: indeed, there is no reliable evidence as to how far back it may have been a cultivated plant in England.

Gaspard Pelletier's reference to its having been found wild in the Netherlands in 1610 points to its ancient cultivation there, as it was probably an escape. It would be useless to reproduce the old descriptions of the numerous varieties of *C. vernus* referred to by the earlier authors, as they cannot be now identified with certainty. Modern bulb lists particularlize the great variety of forms in cultivation; and the whole of these, whether derived from seed or selection, can, I believe, be identified with wild varieties.

As an early spring garden flower there are perhaps few plants that have such a wide-spread popularity or commercial importance as *Crocus vernus*. It has been cultivated by the Dutch for at least three centuries; in England the cultivation of corms for sale is of equal importance, though it is limited to a small district.

I am indebted to Mr. G. F. Barrell, of Spalding, for a full and exhaustive account of bulb-cultivation in South Holland Lincolnshire and extract from it the following notes on the cultivation of Crocuses:—

"The extreme south-east of Lincolnshire is the centre of English bulb-culture. The land has all been reclaimed from the estuary of the Wash, formed by the outfall of the rivers Witham, Welland, Nene, and Ouse, by a process known as warping, which leaves a rich alluvial deposit admirably suited for the growth of every description of bulb or tuber. The tract of country in which the bulb-trade finds a home, is a small belt some twenty miles in length, and not more than three or four in breadth, extending from Sutton Bridge (which is only divided from the adjoining county of Norfolk by the mouth of the river Nene), through the towns of Long Sutton and Holbeach, to Spalding, which forms the head-quarters of the traffic.

The yellow Dutch Crocus is the variety most esteemed for profit; although large quantities of the white and blue varieties (of *C. vernus)*, such as *David Rizzio*, *Prince Albert*, *Queen Victoria*, and *Walter Scott* are grown. The Crocus requires an open situation, and delights in the full blaze of the sun. The *modus operandi* consists in planting the 'seed', as it is termed, (but which is simply the small corms, which are too small for sale, and range from the size of a pea to that of a very small wood-nut,) in drills, much in the same manner that peas are sown. The drills are made about ten inches apart; and in this soil and climate the very smallest corms will bloom, consequently, as they are usually grown in plots of from a rood to an acre in extent, a field of yellow Dutch Crocus, under a bright sun, when in full bloom is a most gorgeous sight.

"The third year after planting they are taken up, but large seed will be 'fat' in two years, and are sorted; the large bulbs being sent to market, and the smaller ones replanted as seed. The planting is usually done in November, the ripened bulbs being harvested in June. The increase, during the time the bulbs are growing from seed into saleable bulbs, is almost incredible; amounting probably to 500 per cent in number, and 2,000 per cent in weight.* From fifteen to twenty millions of Crocuses are perhaps annually sold; the price for what are usually denominated in the seedsmen's catalogues '1st.-sized bulbs,' average from 5s. 6d. to 6s. per thousand, whilst second and third sizes realize from half to two-thirds that sum. The trade is usually carried on through the medium of 'dealers', who purchase the bulbs from cottagers and small farmers, and in their turn dispose of them in bulk to the large seedsmen in London and other places.

"Large quantities are often exported to Holland, as a year's growth there produces a brightness in the skin, which, although imperceptable to the majority of mortals, causes them to acquire a higher value in the market. First-rate samples of Crocus corms will weigh twenty-five to thirty-five pounds per thousand, but extra samples may often be found which bump the scale at forty-two to forty-eight pounds per thousand. It is not too much to say that at least nine-tenths of the Dutch bulbs which are advertised annually as 'Just imported from Holland,' are from Holland in Lincolnshire, and are guiltless of any connection with the Holland on the mainland of the continent of Europe."

It will be gathered from Mr. Barrell's statistics that the saleable corms of Crocus average from half an ounce to three-quarters of an ounce in weight; and that the price received by the growers scarcely exceeds three halfpence per pound,

* The increase in number, and probably the increase in weight, named by Mr. Barrell is, I think, an excessive estimate; as my experience in growing Crocuses is that in ordinary garden culture they do not increase in such a ratio.

or about the value of new potatoes. In view of the fact that the small wild corms of several species of Crocus are largely used as food in Syria and several parts of Asia Minor, where they have a regular commercial value, and looking at their nutritious composition, more than half the weight consisting of sugar and starch, their culture and use as an article of food may be worth consideration.

REFERENCES TO PLATE XXVI.

Fig. 1. Flowering-state, March, actual size; *a*, and *b*, from Pratolino near Florence; *c*, from Mont Cenis.
Fig. 2. With matured leaves and capsule, July 8th, actual size.
Fig. 3. Diagrammatic dissection of scape, ovary, and spathes, actual size
Fig. 4. Stamens and Pistil, magnified two-fold.
Fig. 5. Pollen Grain, magnified one hundred and fifty-fold.
Fig. 6. Stigmata, magnified six-fold.
Fig. 7. Section of leaf, magnified six-fold.
Fig. 8. Corm tunics, magnified two-fold: *d*, cap; *e*, main tunic; *f*, basal tunic.
Fig. 9. Seed, magnified six-fold.

REFERENCES TO PLATE XXVI*b*.

Figs. 1 & 2. *Crocus vernus*, from Monte Sirrente, Abruzzi.
Fig. 3. *Crocus vernus*, from Dalmatia.
Fig. 4. var. *leucorhyncus*. *b*, Stamens and Pistil, magnified two-fold.
Figs 5, 7, & 8. Horticultural varieties.
Fig. 6. var. *albiflorus*, March 16th: *b*, Stamens and Pistil, magnified two-fold.
Fig. 9. var. *siculus*, March 11th: *b*, outer surface of Segment, actual size.

CROCUS VERNUS *Allione.*

G. Maw del.

F. Huth, Lith^r Edin^r

VARIETIES *of* CROCUS VERNUS, *Allioni*.

Fig. 4, LEUCORHYNCUS. *Fig. 6,* ALBIFLORUS. *Fig. 9,* SICULUS.

G. Maw, del. F. Huth, Lith[r] Edin[r]

27. CROCUS MEDIUS.

Section: Involucrati; reticulati (*Herbert*): Schizostigma; autumnal (*Baker*).

Crocus medius, Balbis, Add. Fl. Pedem. p. 83; and Misc. Bot. 1, p. 6; Bert. Desc. Zafferan Ital. vol. ii, p. 150; and Fl. Ital, 1, p. 218; Gay in Fèruss. Bull. Soc. Nat. xi, pp. 352 & 372; and two drawings Bibl. J. D. Hooker; Herbert in Bot. Reg. 1845, vol. xxxi, tab. 37, fig. 5; and drawing, Lindl. Libr. R. Hort. Soc. Lond.; Hist. Crocus, sp. 20, p. 22; from Journ. Hort. Soc. Lond. ii, p. 268; Woods, Tour. Fl. p. 357; Parlat., Fl. Ital. iii, p. 239; Ardoino, Fl. Alp. Marit. p. 364; Moggridge Contrib. Fl. Mentone, tab. xx; Baker, Rev. Sp. Crocus in Gard. Chron. 1873, p. 1632; List Crocus Journ. R. Hort. Soc., new ser., vol. iv, 1877; and Syst. Iridac. in Journ. Linn. Soc., Bot., vol. xvi, p. 85; G. Maw, Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, p. 429; in The Garden, vol. xiv, p. 420, plate cliii, fig. 10; vol. xxi, No. 532, p. 67; and Hist. Crocus in Journ. Linn. Soc., Bot., vol. xix, p. 372.

Cormus circiter $\frac{3}{4}$ poll. (0.019 metr.) latus; tunicæ fibri validuli reticulati. Vaginæ quam spatha breviores. Folia ad florationem intra vaginas celata, in vere pedalia (0.300 metr.) et ultra, duo rarius tria in cormo, $\frac{3}{16}$ — $\frac{1}{4}$ poll. (0.0050—0.0063 metr.) lata, carina angusta, canaliculi laterales lati aperti, tricostati. Spatha monophylla, foliacea, 4 poll. (0.100 metre.) longa, fauci ferme æqualis. Perianthium: faux glabra, ferme alba, intus venosa; segmenta ovato-lanceolata, 2 poll. (0.050 metr.) longa, $\frac{3}{4}$ poll. (0.019 metr.) lata, interiora quam exteriora paullo breviora, splendide purpurea, basi pallidiora, intus 6-7 lineis purpureis, trienti longitudinis æquantia. Antheræ pallide aurantiacæ, filamento flavo bis æquantes. Stylus coccineus, ad apices antherarum fissus. Stigmata patentia, ramulosa, coccinea. Semina ovoidea aurantiaca.

Corm a little broader than high, about three-quarters of an inch (0.010 metre) in diameter under cultivation; much smaller in the wild plant. *Tunic* of strong, wiry, reticulated fibre; the *Basal Tunic* of radiating, occasionally branched fibres; the *Cap* reticulated, produced upwards into a bunch of unbranched fibres.

Sheathing Leaves about five, from half an inch (0.013 metre) to three inches (0.075 metre) in length, falling short of the proper spathe.

Proper Leaves two, or occasionally three, dormant at the flowering-time, produced in the spring to a length of ten or twelve inches (0.250—0.300 metre) three-sixteenths of an inch (0.005 metre) broad, the keel one-sixth the width of the blade, margins of keel and blade slightly ciliated, lateral channels broad and open, containing three low ridges.

Basal Spathe from an inch and a half (0.038 metre) to two inches (0.050 metre) long. *Proper Spathe* monophyllous, foliaceous, four inches (0.100 metre) long, exceeding the sheathing leaves and reaching to within an inch (0.025 metre) of the throat.

Perianth: Tube from four to five inches (0.100—0.125 metre) in length from the ovary to the throat. *Throat* unbearded, nearly white, and internally veined with purple. *Segments* ovato-lanceolate, two inches (0.050 metre) in length, and three-quarters to seven-eighths of an inch (0.019—0.022 metre) broad; the inner somewhat shorter than the outer segments, bright purple, internally veined towards the base with dark purple lines.

Stamens one inch (0.025 metre) high, shorter than the pistil. *Anthers* orange, about twice the length of the white or cream-coloured, glabrous *Filament*. *Pollen Grains* $\frac{1}{350}$ of an inch (0.00008 metre) in diameter, papillose, orange.

Pistil exceeding the stamens, an inch and a quarter (0.032 metre) to an inch and a half (0.038 metre) high, the *Style* dividing at a little below the level of the summit of the anthers, and produced into a spreading mass of bright scarlet capillary stigmata.

Scape three-quarters of an inch (0.019 metre) high at the flowering-time, produced to a length of four or five inches (0.100—0.125 metre) at the maturity of the capsule.

Capsule about an inch (0.025 metre) high and one-third of an inch (0.0084 metre) broad, bearing at its apex an awn-like prolongation of the remains of the proper spathe and tube.

Seed ovoid, one-tenth of an inch (0.0025 metre) broad and three-twentieths of an inch (0.0038 metre) high, rich orange-buff, with prominent raphe and caruncle of the same colour as the body of the seed.

Crocus medius is limited to a narrow belt of the Riviera, extending from longitude 7° 30′ east, in the neighbourhood of Mentone, to longitude 10° 0′ east, in the neighbourhood of Spezzia; ranging in latitude from 43° 45′ north, to 44° 27′ north. It is for the most part found on the spurs of the mountains up to an elevation of about three thousand feet and nowhere occurs at any great distance from the coast. In the neighbourhood of Mentone it has been found in the holly wood on the north-east side of the ridge beyond the cemetery and chapel of St. Lazarus, Gorbio; between Gorbio and Roccabruna; and in the holly forest above Roccabruna west of Mentone; on the east side of Aggel; and on the lower and eastern slopes of Mount Siricocca; also near Tenda, on Monte Bignone above St. Remo; near Laigueglia, Doleedo, and Savona; and at Voltri, between Savona and Genoa. East of Genoa it has been recorded from Bracco; Oldenico and Varese (Varose), north-west of Spezzia; but I know of no record of its occurrence south of Spezzia.

Crocus medius flowers in October and November, the leaves, as in several other autumnal species, remaining dormant till the spring; they are exceptionally wide and in the wild state but two, or at most three, to a corm are produced. The finely divided, bright scarlet, spreading stigma is an object of remarkable beauty, and readily distinguishes it from any other autumnal species. It is a plant of robust habit, and easy of cultivation.

REFERENCES TO PLATE XXVII.

Fig. 1. Flowering-state, October 15th, actual size.
Fig. 1*a*. Inner surface of segment, actual size.
Fig. 2. With matured leaves and capsule, July 19th, actual size.
Fig. 3. Diagrammatic dissection of scape, ovary, and spathes, actual size.
Fig. 4. Stamens and Pistil, magnified two-fold.
Fig. 5. Pollen Grain, magnified one hundred and fifty-fold.
Fig. 6. Stigma, magnified six-fold.
Fig. 7. Section of leaf, magnified six-fold.
Fig. 8. Corm tunics, magnified two-fold: *b*, cap; *c*, main tunic; *d*, basal tunic.
Fig. 9. Seed, magnified six-fold.

Fig. 7, × 6. Fig. 2, July 19th

CROCUS MEDIUS, *Balbis.*

G. Maw del. F. Huth Lith.r Imp.r

Malta.

28. CROCUS LONGIFLORUS.

Section: Involucrati; reticulati *(Herbert)*: Odontostigma; autumnal *(Baker)*.

Crocus longiflorus. Rafin. Caratt. p. 84, tab. xix, fig. 2; Tenore, Mem. Croc. Fl. Nap. p. 27; and Fl. Nap. v, p. 313, tab. 201, fig. 3, and tab. 206; Gay in Féruss. Bull. Sc. Nat. xi, p. 372; and two drawings under the name of *C. longiflorus*, and six drawings as *C. odorus*, Bibl. J. D. Hooker; Guss. Prod. Fl. Sic. Suppl. 1, p. 159; and Fl. Sic. Syn. 1, p. 32; Rchb. Ic. Crit. tab. 946, figs. 1272-3; and Fl. Germ. Excurs. 1, p. 86; Bert. Fl. Ital. 1, 217; Parlat. Fl. Panorm. 1, p. 35; Icon. Fl. Panorm. tab. 2; and Fl. Ital. iii, p. 234; Bot. Reg. xxx, tab. 3, fig. 4; Herbert, drawing Lindl.

Libr. R. Hort. Soc. Lond.; Delicata, Fl. Melit. p. 23; Woods, Tour. Fl. p. 357; Klatt, Revis. Irid. in Linnæa xxxiv, p. 683 and 720; Baker, Rev. Sp. Crocus in Gard. Chron. 1873, p. 1466; List Crocus in Journ. R. Hort. Soc. Lond., new ser., vol. iv, 1877; and Syst. Iridac. in Journ. Linn, Soc., Bot., xvi, p. 83; Pasquale, Notiz. Bot. Merid. D'Ital., Acad. Neap. Fasc. 12; G. Maw, Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, p. 429: in The Garden, vol. xxi, No. 532, p. 67; and Hist. Crocus in Journ. Linn. Soc., Bot., vol. xix, p. 373.

C. odorus, Biv.-Bern. Stirp. Rar. Sic. Manip. 3, p. 8; and Sic. Pl. Cent., tab. 2; Presl. Fl. Sic. Prod. p. 11; Guss. Prod. Fl. Sic. 1, p. 30; Herbert, Hist. Crocus, sp. 11, p. 16, from Journ. Hort. Soc. Lond. ii, p. 262; and drawing Lindl. Libr. R. Hort. Soc. Lond.; Gay, 6 drawings as *C. odorus*, and two drawings as *C. longiflorus*, Bibl. J. D. Hooker.

C. odorus, var. longiflorus, Herbert, Hist. Crocus, p. 16, from Journ. Hort. Soc. Lond. ii, p. 262.

C. odorus, var. melitensis, Bot. Reg. 1844, vol. xxx, tab. 3, fig. 5.

C. longiflorus, var. melitensis, Delicata, Fl. Melit. p. 35.

C. serotinus (not *C. serotinus*, Salisb.,) Bert. Desc. Zafferan Ital. in nuovo collez. opus scient. vol. 2, p. 150.

C. vernus (not *C. vernus* of Curtis, which is *C. aureus* of Sibth. and Smith; and not *C. vernus* of Allione,) Ucria Hort. Reg. Panh. p. 46.

C. Wilhelmii, Fisch. and Meyer.

C. autumnalis monoflore majori aphyllus purpureus, Cupani, Hort. Cathol., p. 61, anno 1696.

C. sylvestris autumnalis, Castelli, Hort. Mesan., p. 8, anno 1640. (not *C. autumnalis*, of Ker, which is *C. serotinus* Salisb.; and not *C. autumnalis*, of Brotero, which is *C. Clusii*, Gay.)

? *C. Visianicus*, Herbert, Hist. Crocus, sp. 13, p. 17; from Journ. Hort. Soc. Lond., ii, p. 263.

Cormus ferme sphæricus, circiter ½ poll. (0.013 metr.) latus. Tunicæ fibri reticulati in basi membranacea confecta. Vaginæ quam spatha basalis paullo longiores. Folia ad florationem, spathæ veræ æqualia, matura 8-9 poll. (0.200—0.225 metr.) longa, glabra, circiter ⅛ poll. (0.0032 metr.) lata. Spatha basalis quam ovarium multo longior, et ferme vaginis æquans. Spatha vera monophylla, foliacea. Perianthium: tubus flavus; faux aurantiaca, paullo barbata; segmenta circiter 1½ poll. (0.038 metr.) longa, lilacina, concolora vel extus purpureo-venosa, (in forma *melitensis* rarius signis penniformibus purpureis ornata). Antheræ hastatæ, acuminatæ, filamento flavo plus quam bis longiores. Stylus coccineus ad basin antherarum fissus. Stigmata integra nonnunquam subdivisa capillacea, antheris æquantia vel superantia. Capsula purpurea. Semina sphærica coccinea.

Corm nearly spherical, from half an inch (0.013 metre) to three-quarters of an inch (0.019 metre) in diameter. *Tunic* of distinctly reticulated fibre on a membranous base.

Sheathing Leaves about five, from half an inch (0.013 metre) to three inches (0.075 metre) in length, falling short of the proper spathe.

Proper Leaves about three, just appearing with the flowers, reaching to the level of the proper spathe at the flowering-time and produced in the spring to a length of eight or nine inches (0.200—0.225 metre), about one-eighth of an inch (0.0032 metre) broad, the keel one-third the width of the blade, the lateral channels broad and open.

Basal Spathe about two inches (0.050 metre) in length, much exceeding the ovary. *Proper Spathe* monophyllous, three and a half inches (0.088 metre) in length, foliaceous at the extremity.

Perianth: *Tube* about four inches (0.100 metre) in length from the ovary to the throat, yellow, *Throat* orange, slightly bearded. *Segments* an inch and a half (0.038 metre) long and from half an inch (0.013 metre) to two-thirds of an inch (0.017 metre) broad, of a uniform pale vinous-lilac, yellow towards the base, or externally veined or feathered with purple.

Stamens about three-quarters of an inch (0.019 metre) in length. *Anthers* hastate, tapering upwards, orange, about twice the length of the orange *Filament*. *Pollen Grain* $\frac{1}{400}$ of an inch (0.00006 metre) in diameter, slightly papillose, orange.

Pistil slightly exceeding the anthers; the *Style* dividing at about the level of the base of the anthers and produced into bright scarlet stigmata, which are entire, or broken up into capillary divisions.

Scape, one or more within each set of sheathing leaves, about an inch and a half (0.038 metre) high at the flowering-time and produced to a height of three inches (0.075 metre) at the maturity of the capsule.

Capsule barely three-quarters of an inch (0.019 metre) in length; purple.

Seed $\frac{1}{12}$ of an inch (0.0021 metre) broad and $\frac{1}{10}$ of an inch (0.025 metre) high, with a rich red papillose surface; the raphe, chalaza and caruncle but slightly prominent, of the same colour as the body of the seed.

Crocus longiflorus is an abundant species between longitude 12° and 16° 30′ east, and latitude 35° 50′ and 41° 0′ north; in Southern Italy, Sicily, and the islets to the west, and Malta. It has also been recorded from Dalmatia, and Dr. Kerner's herbarium contains a Crocus labelled "Dalmatia", which appears to be this species; its range of latitude, therefore, may perhaps be extended to 44° or 45° north.

I must here notice a record by Herbert of the occurrence of *C. Salzmanni* on the mountains near Tunis. If a Crocus has ever been found there it is highly improbable that *C. Salzmanni*, which belongs to a group limited to the extreme west of the area of distribution, should occur so far east as Tunis; I would suggest the probability of its being *C. longiflorus*.

In Southern Italy it occurs on the Sierra Mongiana, near Salerno; on Monte de la Stella, near Pæstum; the Sierra de San Bruno; at Santa Palo; Arca; Rosarno; and hills between Arinosi and Anoja, in Lower Calabria.

In Sicily it is abundant about Messina and Palermo; at Baieda (Baida); Santa Maria de Gesu; and in the Val de Mazzaro (Mazzara); and is said by Parlatore to occur throughout the whole of the island, and on the islands of Favignana, Levanzo and Maretimo on its west coast. Its occurrence in Malta was known to Herbert, who described the Malta form as a variety, under the name of *melitensis;* but although it is more often striped and feathered than the common form found in Calabria, it has no claim to rank as a constant variety. Delicata, in his *Flora Melitensis*, names Zalia, Dinyli, Metahleb, and Boschetto, as localities in Malta where it occurs.

Crocus longiflorus has often been confounded with *C. Thomasii*, a form of *C. sativus* occurring in the south-east of Italy. The saffron-like pistil more nearly resembles that of *Crocus sativus* than that of any other Crocus and there is a general resemblance in the two species; but the former is easily distinguished by its monophyllous proper spathe, its glabrous leaves, spherical pollen grain, and red seed; and none of the forms of *C. sativus* are veined and feathered.

Crocus longiflorus is very variable: in the type plant the flowers are of a uniform vinous-lilac, yellow at the throat, but they are often veined or distinctly feathered with purple. The pistil is also very variable, either entire, as in *C. sativus*, or broken up into fine capillary divisions. In Sicily Saffron is collected from the wild plant.

The flowering-time is from the early part of October into November. It is a very free flowering species, several scapes being produced within each set of sheathing leaves, and is an attractive plant both for the open border and cold frame.

REFERENCES TO PLATE XXVIII.

Fig. 1. *a*, *b*, Flowering-state, October 16th, actual size: *c*, inner surface of segment; *d*, *e*, feathered variety from Malta.
Fig. 2. With matured leaves and capsule, June 10th, actual size.
Fig. 3. Diagrammatic dissection of scape, ovary, and spathes, actual size.
Figs. 4 & 6. Stigmata, magnified six-fold.
Fig. 5. Stamens and Pistil, magnified two-fold.
Fig. 7. Pollen Grain, magnified one hundred and fifty-fold.
Fig. 8. Corm tunics, magnified two-fold: *h*, cap; *i*, main tunic; *j*, basal tunic.
Fig. 9. Seed, magnified six-fold.
Fig. 10. Section of leaf, magnified twelve-fold

Fig. 1, α. Oct. 16th

Fig. 2, June 10th

CROCUS LONGIFLORUS, *Rafin.*

C. odorus, Biv.-Bern.

J. Maw del. F. Huth, Lith. Edinr.

CROCUS SATIVUS AND ALLIED SPECIES.

The following forms, which have heretofore been considered entitled to specific rank, I have, with the concurrence of Mr. Baker, grouped as varieties of *C. sativus* (29), and of *C. hadriaticus* (30); they compose a well-marked and isolated section of which *C. sativus* may be taken as the type.

In the whole of them the leaves are ciliated, appearing with the autumnal flowers; their pistils are scarlet and entire; the pollen grains are of irregular outline and vary much in size; the proper spathe is diphyllous; the throat bearded. The corm tunic consists of fine silky reticulated fibre, produced to a considerable height above the summit of the corm; the seeds are madder-brown in colour.

Ranging from Italy to Kurdistan, through 35° of longitude, *C. sativus* presents a great variety of forms, between which it is impossible to draw any definite line. I take the cultivated Saffron as the type, though no precisely identical form is known in a wild state.

29. CROCUS SATIVUS.

Section: Involucrati; reticulati *(Herbert)*: Holostigma; autumnal *(Baker)*.

Crocus sativus, Linn., Sp. Plant. ed. 1, vol. i, p. 36; ed. 2, vol. i, p. 50; Fuchs. Hist. Stirp. p. 144; Lobel, Advers. p. 53; Blackwell, Herb. vol. i, tab. 144, fig. i; Miller, Icon. tab. 3; Rousseau, Bot. 4; Woodville, Med. Bot. iv, 259; Red., Lil., iii, tab. 173; Salisb., drawing, Bibl. Bot. Br. Museum; Hayne, Arzneigewächse, vi, tab, 25; Eng. Bot., ed. 2, vol. i, p. 24, tab. 43; ? Tenore, Fl. Med. Univ. i, p. 21; ? Mem. Croc. Fl. Nap., p. 27; ? and Fl. Nap. 206; Wagner, Pharm.-Mediz. Bot. 29; Bouché, Gattung Crocus in Linnæa, vol. i, p. 223 & 227; Bert., Disc. Zafferan Ital., No. 7, 675; and Nuov. Collez. i, c, p. 145; Gay in Féruss. Bull. Sc. Nat. xi, p. 351 & 371, and three drawings, Bibl. J. D. Hooker; Ker Irid. Gen., p. 77; Hort. Fl. Aust. i, p. 42; Lam., Encycl. tab. 30, fig. 1; Nees, Düsseld. 58; and Gen. Plant. Fl. Germ. iii, 10; Guimp. & Schl. Pharm., 173; Rchb., Ic. Fl. Germ., vol. ix, p. 10, tab. ccclx, figs. 798-799; and Fl. Exot., p. 85; ? Visiani, Fl. Dalm. i, p. 121, & ii, p. 29; Herbert, Hist. Crocus, sp. 18, p. 20, from Journ. Hort. Soc. Lond. ii, p. 266; Woods, Tour. Fl. p. 357; Berg. & Schmidt, Darstellung i; Tchihatcheff, Asie Min. part iii, Bot., vol. ii, p. 524; Willkomm & Lange, Prod. Fl. Hisp., i, p. 146; Gibson, Fl. Essex, p. 311; Klatt, Rivis. Irid. in Linnæa xxxiv, p. 719; Baker, Rev. Sp. Crocus in Gard. Chron. 1873, p. 1402; List Crocus in Journ. R. Hort. Soc. Lond., new ser., vol. iv, 1877; and Syst. Iridac. in Journ. Linn. Soc., Bot., vol. xvi., p. 82; Bentley & Trimen, Med. Plants, no. 274; G. Maw in Gard. Chron., new ser., 1879, p. 234-235; Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, p. 430; in The Garden, vol. xxi, No. 532, p. 67; and Hist. Crocus in Journ. Linn. Soc., Bot., vol. xix, p. 373; Boiss., Fl. Orient., vol. v, part i, p. 100.

C. autumnalis, (not *C. autumnalis*, Ker, which is *C. serotinus*, Salisb.; not *C. autumnalis*, Brotero, which is *C. Clusii*, Gay.) Lam. in Eng. Bot. v, 343.

C. officinalis, Martyn, Fl. Rustica, vol. 2, tab, 58: Haworth in Trans. Hort. Soc. Lond., vol. i, p. 139.

C. officinalis sativus, Huds., Fl. Angl. i., p. 13.

C. cashmerianus, Royle, Illust. Bot. Himal., 90.

Var. 1. *Orsinii*, G. Maw in Gard. Chron. 1879, p. 234-5; Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, p. 430; in The Garden, vol. xxi, No. 532, p. 67.

C. Orsinii, Parlatore, Fl. Ital. iii, p, 238.

"*C. sativus, sauvage*"; Tenore, exsic.

C. sativus, Baker, Rev. Sp. Crocus in Gard. Chron. 1873, p. 1402; List Crocus in Journ. R. Hort. Soc. Lond., new ser., vol. iv, 1877; and Syst. Iridac. in Journ. Linn. Soc., Bot., vol. xvi, p. 82.

Var. 2. *Cartwrightianus*, G. Maw, Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, p. 430; in The Garden, vol. xxi, No. 532, p. 67.

C. Cartwrightianus, Herbert in Bot. Reg. 1843, vol. xxix, misc., p. 82, No. 131; 1844, vol. xxx, tab. 3. fig. 6; 1845, vol. xxxi, tab. 37, figs. 6 & 7; and Hist. Crocus, sp. 14, p. 18, from Journ. Hort. Soc. Lond., ii, p. 264; Moore in Fl. Mag. ii, p. 273; Tchihatcheff Asie Min., part iii, Bot., vol. ii, p. 524; Baker, Rev. Sp. Crocus in Gard. Chron. 1873, p. 1402; List Crocus in Journ. R. Hort. Soc. Lond., new ser., vol. iv, 1877; and Syst. Iridac. in Journ. Linn. Soc., Bot., vol. xvi, p. 82.

C. sativus, Sibth. & Smith, Prod. Fl. Græca, i, p. 23: Heldr. Herb. Græc. Normal, 552, and plant exsic., No. 2558.

C. odorus, (not *C. odorus*, Biv-Bern., which is *C. longiflorus*, Rafin.) Hampe in Spruner Pl. exsic. ex Atticæ, anno. 1840.

C. græcus (not *C. græcus*, Herbert, which is a var. of *C. biflorus*), Chappellier in Bull. Soc. Bot. France, 1873, vol. xx, p. 191-3; Heldr. Sert. Plant Nov. Hellen. in Nuovo. Giorn. Bot. Ital., 1876, vol. vii, No. 4, p. 11.

Var. 3. *Haussknechtii*, G. Maw, Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, p. 230; in The Garden, vol. xxi, No. 532, p. 67.

C. Haussknechtii, Boiss., Fl. Orient., vol. v, p. 100.

C. sativus, Baker, Rev. Sp. Crocus in Gard. Chron. 1873, p. 1402; List Crocus in Journ. R. Hort. Soc. Lond., new ser., vol. iv, 1877; and Syst. Iridac. in Journ. Linn. Soc., Bot., vol. xvi, p. 82.

Var. 4. *Elwesii*, G. Maw, Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, p. 230; in The Garden, vol. xxi, No. 532, p. 67.

Var. 5. *Pallasii*, G. Maw, Synops, Gen. Crocus in Gard. Chron., new ser., vol. xvi, p. 430; in The Garden, vol. xxi, No. 532, p. 67.

C. Pallasii, M. Bieb., Fl. Taur., vol. i, p. 27 & vol. iii, suppl. p. 35; Goldbach Dissert. Croci. Hist. No. 13; Gay three drawings Bibl. J. D. Hooker: Alsch. Fl. Jadren. p. 14: Rchb. Ic. Fl. Germ., vol. ix, p. 9, tab. ccclx, figs. 796-797; and Ic. Crit. x, 1281; Vis. Fl. Dalm. vol. i, p. 120; Ledeb. Fl. Ross., vol. iv, p. 109; Tchihatcheff Asie Min. part iii, Bot., vol. ii, p. 524; Klatt Rivis, Irid. in Linnæa, xxxiv, p. 675 & 719; Baker, Rev. Sp. Crocus in Gard. Chron. 1873, p. 1402; List Crocus in Journ. R. Hort. Soc. Lond., new ser., vol. iv, 1877; and Syst. Iridac. in Journ. Linn. Soc., Bot., vol. xvi, p. 82; G. Maw in Gard. Chron. 1879, p. 234-235.

C. Pallasianus, Herbert in Bot. Reg. 1844, vol. xxx, tab. 3, fig. 2; Hist. Crocus, sp. 16, p. 19, from Journ. Hort. Soc. Lond., vol. ii, p. 265, and drawing in Lindl. Libr. R. Hort. Soc. Lond.

C. campestris, Pallas in Herb. Lambert.

C. hybernus, Fridw. in Griseb. Fl. Rumel. ii, 374.

? C. Visianicus, Herbert in Bot. Reg. 1845, vol. xxxi, misc. 78; Hist. Crocus, Sp. 13, p. 17, from Journ. Hort. Soc. Lond., vol. ii, p. 263, and drawing in Lindl. Libr. R. Hort. Soc. Lond.; Baker, Rev. Sp. Crocus in Gard. Chron. 1873, p. 1402; List Crocus in Journ. R. Hort. Soc. Lond., new ser., vol. iv, 1877; and Syst. Iridac. in Journ. Linn. Soc., Bot., vol. xvi, p. 82.

? C. odorus, (not *C. odorus*, Biv.-Bern., which is *C. longiflorus*, Rafin.) Visiani, Stirp. Dalm., p. 32; Pett. Bot. Wegw., No. 307.

C. longiflorus, (not *C. longiflorus*, Rafin.) Rchb. Fl. Exot. in add. p. 140, No. 589.

C. Thomasii, Tenore, Mem. Croc. Fl. Ital., p. 12, plate iv; and Fl. Nap. 5, p. 303; Gay in Féruss. Bull. Sc. Nat., vol. xi, p. 364, and 372, (excl. plant of Monte della Stella;) Bertoloni, Fl. Ital. i, p. 217 in part; Rchb., Ic. Crit. 951; Parlat. Fl. Ital. iii, p. 237; Baker, Rev. Sp. Crocus in Gard. Chron. 1873, p. 1402; List Crocus in Journ. R. Hort. Soc. Lond., new ser., vol. iv, 1877; and Syst. Iridac. in Journ. Linn. Soc., Bot., vol. xvi, p. 82; G. Maw in Gard. Chron. 1879, p. 234-5; Pasquale, Notiz. Bot. Merid d' Ital. p. 1, from Bull. Soc. Tosc. Ortic. anno vi, num. 11, p. 37.

C. Thomassianus, Herbert in Bot. Reg. 1844, xxx, tab. 3, fig. 6; and Hist. Crocus sp. 17, p. 20, from Journ. Hort. Soc. Lond. vol. ii, p. 266.

C. sativus, Tenore, Fl. Med. i, p. 12.

Cormus magnus, basi plana, lateribus verticalibus, 1—1¼ poll. (0.025—0.032 metr.) latus, 1 poll. (0.025 metr.) altus. Tunicæ fibri tenues sericei reticulati, ad apicem in fasciculo longo 1-2 poll. (0.025—0.050 metr.) fibrorum liberorum producti. Vaginæ fauce et spatha ferme æquantes. Folia ⅛ poll. (0.0032 metr.) lata, floribus ad florationem æquantia, in vere 18-24 poll. (0.450—0.600 metr.) longa, laminæ margines et carina ciliatæ. Spatha diphylla, fauci ferme æqualis. Perianthium: faux alba vel purpurea barbata; segmenta 2 poll (0.050 metr.) longa, splendide lilacina apud faucem purpurea, venis purpureis ubique suffusa. Antheræ aurantiacæ, quam filamentum album vel lilacinum longiores. Stylus apud basin antherarum fissus. Stigmata integra pendula coccinea, nonnunquam

CROCUS SATIVUS, *Linneus & var.* ORSINII, *Parlatore.*

G. Maw del.

F. Huth, Lith^r Edin^r

fimbriata, 2 poll. (0.050 metr.) longa, antheras multo sæpius, etiam segmentis, superantia. Planta culta nunquam sementat. Semina formarum ferarum affinium, ferme sphærica, obscure rubra.

Corm large, with a flat base, and vertical sides, from an inch (0.025 metre) to an inch and a quarter (0.032 metre) broad and one inch (0.025 metre) high. *Tunic* of fine silky reticulated fibre, produced at the summit into a bunch of fibres, from one inch (0.0025 metre) to two inches (0.050 metre) in height. *Basal Tunic* of fine, radiating unbranched fibres.

Sheathing Leaves four or five, from an inch (0.025 metre) to five inches (0.125 metre) in length, generally reaching to, or exceeding the proper spathe.

Proper Leaves six or eight, appearing with the flowers and produced in the spring to a length of fifteen or eighteen inches (0.375 metre), one-twelfth of an inch (0.0021 metre) broad, the keel about half the width of the blade, the margins of keel and blade ciliated, the lateral channels narrow, the reflected margins of the blade nearly meeting the margins of the keel.

Basal Spathe from two, to two and a half inches (0.050—0.063 metre) long, much exceeding the ovary. *Proper Spathe* diphyllous, from three to four inches (0.075—0.100 metre) in length, reaching to the level of the sheathing leaves.

Perianth: Tube about four inches (0.100 metre) in length from the ovary to the throat. *Throat* purple, bearded. *Segments* two inches (0.050 metre) long, and three-quarters of an inch (0.019 metre) broad, bright lilac, purple towards the throat, and suffused throughout with purple veins.

Stamens nearly an inch (0.025 metre) high, much shorter than the pistil. The *Anthers* yellow, half an inch (0.013 metre) in height, a little longer than the white or purple *Filament*. *Pollen Grains* orange, of irregular form and size, varying from $\frac{1}{400}$ to $\frac{1}{300}$ of an inch (0.00006—0.00008 metre) in diameter.

Pistil much exceeding the stamens, from an inch and a quarter (0.032 metre) to two inches (0.050 metre) in height; the *Style* dividing at the level of the base or at the middle of the anthers, and produced into almost entire scarlet stigmata, which in the cultivated Saffron are lax and drooping.

Scape at the flowering-time about three-quarters of an inch (0.019 metre) in height, each set of sheathing-leaves containing one or more scapes.

Capsule effete or absent in the cultivated Saffron; in the wild forms from three-quarters of an inch (0.019 metre) to an inch (0.025 metre) in length and a third of an inch (0.0084 metre) broad.

Seed absent in the cultivated Saffron; in the wild forms about an eighth of an inch (0.0032 metre) in diameter, nearly spherical, madder-brown in colour; the prominent raphe, chalaza and caruncle of the same colour as the body of the seed.

Though naturalized in several parts of Europe and Western Asia the type form, or the Saffron of cultivation, is not known to occur in a wild state. As I have treated of Saffron under a separate chapter I here describe only the several wild forms.

I group as varieties of *Crocus sativus* several Crocuses which previous writers deal with as separate species. *Crocus cashmerianus*, of Royle, which I have flowered from corms obtained by the late Mr. Isaac Anderson-Henry, from Cashmere, is precisely identical with the cultivated Saffron and is probably an escape from cultivation.

Var. 1. *Orsinii*.—Of the wild forms, *C. Orsinii*, of Parlatore, most nearly resembles

the cultivated Saffron; indeed there is nothing to distinguish it from the type except that the pistil (Plate XXIX, fig. 6,) is shorter and the stigmata are more erect. Fig. 1, Plate XXIX, the pistil excepted, which is that of the cultivated Saffron, is drawn from a specimen in the Naples herbarium, communicated by Tenore, but whether collected by him or by Orsini is uncertain. This, and similar specimens in the Kew herbarium, are labelled as follows:—"'*C. sativus sauvage.*' Monte de Fiori, Ascoli. Declivities facing south-east at an elevation of 2000 feet. Tenore miscit, Aug. 1830. Orsini miscit, June 1831." Another record is as follows:—"Monte de Fiori, Ascoli. South-east exposure, 3200 feet." Monte de Fiori is between six thousand and seven thousand feet in height. In the annotated copy of Wood's *Tourists' Flora*, which belonged to the author, occurs the following *MS.* note:—"Sponte nascitur in Montibus Piceni prope Asculum, et Precipue Sylva sua dictu Dagliabeti unde habui ab Orsino: Floret Sepr.", probably copied from Bertoloni's *Fl. Italica*, vol. i, p. 216. These records would appear to refer to three distinct localities in the neighbourhood of Ascoli; the last, Dagliabeti, is three miles to the north-west of Ascoli, and Monte de Fiori immediately to the south of the town. I have made on three separate occasions, twice in company with Mr. C. H. Cobbold, a thorough search for the Crocus, both over the mountain and in the woods of Dagliabeti, but without success. The habitats indicated are wild and uncultivated and not such as would imply an escape from cultivation. As this is the only locality in which *C. sativus*, all but identical with the cultivated Saffron, has been found in an apparently wild habitat, a new-finding of the plant which was gathered fifty years ago would be of great interest.

Monte de Fiori, longitude 13° 35′ east, is the most western point from which any form of *C. sativus* has been recorded.

Var. 2. *Cartwrightianus*, Plate XXIX*b*, scarcely differs from the type excepting in stature, the flowers being much smaller: the segments are very variable in size and proportion; the corm in cultivation attains a size equal to that of the cultivated Saffron; the long pistil, which always exceeds the stamens, distinguishes it from the other varieties. It is an abundant plant in eastern Greece, and the Cyclades, to which district it is limited. It is common near the Pyræus, on Mount Hymettus, and other mountains about Athens; also on the islands of Teno, Scyro, and Seripho, and on the highest parts of the Island of Andros, where, Mr. Quintana, H. M. V. Consul at Syra, informs me, it is gathered for medicinal purposes, and that a pigment is made from the pistils or Saffron, called *Zafran*.

It has also been recorded from near Canea, in Crete. Visiani mentions its occurrence on hills about Salona and Monte Marion, near Spalatro, in Dalmatia; but both the Dalmatian and Cretan forms seem to be identical with Var. 5. *Pallasii*.

Var. 3. *Haussknechtii*, described by Boissier as a species distinct from *sativus*,

CROCUS SATIVUS, *Linn. var. 2* CARTWRIGHTIANUS.

C. Cartwrightianus, Herbert. *C. græcus, Chappellier.*

CROCUS SATIVUS, *Linn.* Var. 4 ELWESII, *G. Maw.*

G Maw del.

F. Huth, Luth^r Edin^r

seems to me no more entitled to specific rank than the other forms of this group. The corm is somewhat smaller than that of the type and the pistil shorter in relation to the height of the stamens. The most remarkable character is the great height to which the cap of the tunic is produced as a bunch of silky fibres above the summit of the corm. It was collected by Haussknecht at an altitude of five thousand feet on Dèlechani and Sangur, calcareous mountains between Kermanchah (Kermanshah) and Hamedan, in western Persia; and on October 18th, 1865, at Kharput (Karput, Charput,) in Kurdistan. This is the most eastern point at which any form of *C. sativus* occurs in an undoubtedly wild state.

Var. 4. *Elwesii*, Plate XXIX*c*, is closely allied to the well-known and widely distributed form, var. *Pallasii*, but it is a plant of larger stature. The corm is large like that of the type and of the var. *Cartwrightianus;* the pistil is short, scarcely exceeding the stamens, as in var. *Pallasii*. In modern times it was first collected in the spring of 1874 by Mr. Elwes, on the Boz Dagh (Tmolus), east of Smyrna; and in May, 1877, I found it abundantly, up to altitudes of from three thousand to four thousand feet, on the Taktale Dagh, Nymph Dagh, and the Yamanlah Dagh, near Smyrna, and also a smaller form on the Hippurite Limestone Plateau of Boujah, near Smyrna. The following passage from Virgil may refer to it:—"Nonne vides croceos ut Tmolus [Boz Dagh] odores".—*Georg.* i. 56. It flowers in October.

Var. 5. *Pallasii*, Plate XXIX*d*, is smaller in all its parts than the var. *Elwesii*. The corm is notably smaller than that of any of the other forms; the pistil as in var. *Elwesii*, is nearly always shorter than the stamens. Var. *Pallasii*, with which I associate the South Italian *C. Thomasii* of Tenore, is by far the most widely distributed form of *C. sativus*, ranging between longitude 15° east, and longitude 35° east, and latitude 35° north, and latitude 46° north. The Italian plant was first described by Tenore. In the neighbourhood of Taranto, and the district west of Taranto, it appears to be fairly abundant. It had not been found in recent years till Mr. F. N. Reid re-discovered it in the Gravina de Leucaspide, and the grounds surrounding Sir J. P. Lacaita's house at Leucaspide, between the Plain of Taranto and the Murgie Mountains. Mr. C. C. Lacaita also found it in the stony woods of Quercus Cerris, near San Basilio, between Bari and Taranto, where it commences to flower at the end of October. The older records include the following localities:—woody places Serra di San Bruno, Calabria; near Laterza (La Terza); and at Foje and Montocchio, near Potenza, in the Basilicata. It was also found by Signor Siacci about the year 1830, in meadows near Gravina, in Apulia; but the late Professor Cesati informed me that the ground has since been broken up and the plant extirpated. Another recorded habitat, Monte della Stella, given by Tenore, is erroneous and refers to *C. longiflorus*.

A small form of *C. sativus*, which is, I think, identical with *Pallasii* occurs in the neighbourhood of Canea, in Crete; I also have it in cultivation from the summit of the Bithynian Olympus, and from the neighbourhood of Patras, in the Morea. It is a common plant in Dalmatia and has been recorded from Tadram, Ragusa, rocky hills about Zara, Dernis, Zagarie, Melicozi, Sebenico, Boraja, Salona, and Spalatro; and from the islands of Bua, Solta, Brazza, and Melda.

It extends across European Turkey, and has been recorded from the Rhodope or Despoto Dagh Mountains, near Philippopolis, Roumelia, and between Cæsnavoda and Kustendji, in Bulgaria. The Crimea appears to be its most north-eastern limit, where it occurs on the Steppes near Simpheropol (Archmenchat).

Omitting the habitats in which the economic Saffron Crocus has been naturalized, the indigenous forms range through ten degrees of latitude, from Crete, latitude 35° north, to the Crimea, latitude 45° north; and through 34° of longitude, from Monte di Fiori, in Italy, longitude 13° 30′ east, the habitat of var. *Orsinii*, to longitude 48° east, the habitat in western Persia of var. *Haussknechtii*.

REFERENCES TO PLATE XXIX.—*C. Sativus.*

Fig. 1. Flowering-state, autumnal, actual size, of var. *Orsinii*, from a specimen in the Naples Herbarium, communicated by Tenore, and labelled "*Crocus sativus sauvage*," Monte de Fiori, Ascoli. (Note: the drooping stigma represents that of the cultivated *C. sativus*.)
Fig. 2. Inner surface of segments of *C. sativus*, actual size.
Fig. 3. *C. sativus* with matured leaves, April 15th, actual size.
Fig. 4. Diagrammatic dissections of scape, ovary, and spathes, actual size: *a*, *C. sativus*; *b*, var. *Orsinii*.
Fig. 5. Stamens and Pistil of *Crocus sativus*, magnified two-fold.
Fig. 6. Stamens and Pistil of var. *Orsinii*, magnified two-fold.
Fig. 7. Pollen Grain, magnified one hundred and fifty-fold.
Fig. 8. Section of leaf, magnified six-fold.
Fig. 9. Corm tunic, magnified two-fold.

REFERENCES TO PLATE XXIX*b*.—Var. *Cartwrightianus*.

Fig. 1. Flowering-state, January 3rd, actual size.
Figs. 2, 3, & 4. Flowers and segments, actual size.
Fig. 5. With matured leaves, June 26th, actual size.
Fig. 6. Diagrammatic dissection of scape, ovary, and spathes, actual size.
Fig. 7. Stigma, magnified four-fold.
Fig. 8. Stamens and Pistil, magnified two-fold.
Fig. 9. Pollen Grain, magnified one hundred and fifty-fold.
Fig. 10. Section of leaf, magnified six-fold.
Fig. 11. Seed, magnified six-fold.
Fig. 12. Corm tunics, magnified two-fold: *d*, cap; *e*, main tunic; *f*, basal tunic.

REFERENCES TO PLATE XXIX*c*.—Var. *Elwesii*.

Fig. 1. Flowering-state, October 13th, actual size.
Fig. 2. With matured leaves and capsule, July 14th, actual size.

Fig. 1, Decr 9th

Fig. 3, June 17th

Fig. 9 × 12.

CROCUS SATIVUS, *Linn. var. 5,* PALLASII.

C. Pallasii, M. Bieb. C. Pallasianus, Herbert. C. campestris, Pallas. C. hybernus, Fridw. C. Thomasii, Tenore. C. Thomassianus, Herbert.

J. Mawe del.

F. Huth, Lath.r Edin.r

Fig. 3. Diagrammatic dissection of scape, ovary, and spathes, November 22nd, actual size.
Fig. 4. Stamens and Pistil, magnified two-fold.
Fig. 5. Pollen Grain, magnified one hundred and fifty-fold.
Fig. 6. Stigma, magnified six-fold.
Fig. 7. Section of leaf, magnified twelve-fold.
Fig. 8. Lateral channel of leaf, magnified fifty-fold.
Fig. 9. Corm tunics, magnified two-fold: *a*, cap; *b*, basal tunic.
Fig. 10. Seed, magnified six-fold.

REFERENCES TO PLATE XXIX*d*.—Var. *Pallasii*.

Fig. 1. Flowering-state, December 9th, actual size; *a*, *c*, *d*, and *e*, from Dalmatia; *b*, *C. Thomasii*, Tenore, from South Italy.
Fig. 2. Inner surface of segment, actual size.
Fig. 3. With matured leaves, June 17th, actual size.
Fig. 4. Diagrammatic dissection of scape, ovary, and spathes, actual size.
Fig. 5. Stamens and Pistil, magnified two-fold: *f*, *h*, from South Italy; *g*, from Dalmatia.
Fig. 6. Pollen Grain, South Italy, magnified one hundred and fifty-fold.
Fig. 7. Pistil, Dalmatia, magnified six-fold.
Fig. 8. Stigma, South Italy, magnified six-fold.
Fig. 9. Section of leaf, South Italy, magnified twelve-fold.
Fig. 10. Seed, Dalmatia, magnified six-fold.
Fig. 11. Corm tunics, South Italy, magnified two-fold: *i*, main tunic; *j*, basal tunic.

30. CROCUS HADRIATICUS.

Section: Involucrati; reticulati *(Herbert)*: Holostigma; autumnal *(Baker)*.

Crocus hadriaticus, Herbert in Bot. Reg. 1843, vol. xxix, misc. p. 77, and 1847, vol. xxxiii, tab. 16, fig. 7-9; and Hist. Crocus, sp. 12, p. 16; from Journ. Hort. Soc. Lond., vol. ii, p. 262; Baker Rev. Sp. Crocus in Gard. Chron., 1873, p. 1402; List Crocus, sp. 19, in Journ. R. Hort. Soc. Lond., new ser., vol. iv, 1877; and Syst. Iridac. in Journ. Linn. Soc., Bot., vol. xvi, p. 83; G. Maw in Gard. Chron. 1879, p. 234-5; Synops. Gen. Crocus in Gard. Chron., new ser., vol. xvi, p. 430; in The Garden, vol. xxi, No. 532, p. 68; and Hist. Crocus in Journ. Linn. Soc., Bot., vol. v, p. 373; Boiss. Fl. Orient. vol. v, part 1, p. 101.

? *C. peloponnesiacus*, Orphan. in Boiss. Diag. Ser. 2, iv, p. 95; and Fl. Græc. exsic. No. 68; Baker Rev. Sp. Crocus in Gard. Chron. 1873, p. 1431; List Crocus, sp. 22, in Journ. R. Hort. Soc. Lond., new ser., vol. iv, 1877; and Syst. Iridac. in Journ. Linn. Soc., Bot., vol. xvi, p. 83; G. Maw in Gard. Chron. 1879, p. 234-5. *C. hadriaticus*, var. *β peloponnesiacus* Boiss. Fl. Orient. vol. v, part 1, p. 101.

? *C. nivalis*, Klatt, Rev. Irid. in Linnæa, vol. xxxiv, p. 270.

Var. 1. *chrysobelonicus*, Herbert in Bot. Reg. 1847, vol. xxxiii, tab. 16 (17), fig. 8-9; and Hist. Crocus, sp. 12, var. 1, p. 17; from Journ. Hort. Soc. Lond., vol. ii, p. 263; G. Maw, Synops. Gen. Crocus in Gard. Chron., new ser., vol. xvi, p. 430; *C. Cartwrightianus*, var. *leucadensis*, Herbert in Bot. Reg., 1845, vol. xxxi, misc. p. 4.

Var. 2. *Saundersianus*, Herbert in Bot. Reg. 1847, vol. xxxiii, tab. 16 (17), fig. 7; and Hist. Crocus, sp. 12, var. 2, p. 17; from Journ. Hort. Soc. Lond., vol. ii, p. 263; G. Maw Synops. Gen. Crocus, in Gard. Chron., new ser., vol. xvi, p. 420.

Cormus magnus, circiter 1 poll. (0.025 metr.) latus, et $\frac{3}{4}$ poll. (0.019 metre.) altus, basi plana, lateribus verticalibus. Tunicæ fibri sericei reticulati tenues, ad apicem in fasciculo fibrorum liberorum $\frac{3}{4}$ poll. (0.019 metr.) prolongati. Vaginæ spathæ ferme æquantes. Folia ad florationem fauci æquantia, $\frac{1}{12}$ poll. (0.0021 metr.) lata, in vere 15-18 poll. (0.375—0.450 metr.) longa, laminæ marginibus et carina ciliatis. Spatha basalis ovarium superans, scapos plures includens. Spatha vera membranacea diphylla, vaginis ferme celata. Perianthium: faux barbata; segmenta alba, nonunquam basi purpurea, circiter $1\frac{1}{2}$ poll. (0.038 metr.) longa, $\frac{1}{2}$-$\frac{3}{4}$ poll. (0.013—0.019 metr.) lata. Antheræ splendide aurantiacæ, acuminatæ, quam filamenta alba vel purpurea plus quam bis longiores. Stylus ad medias antheras fissus. Stigmata integra coccinea, antheras superantia.

Corm large, about an inch (0.025 metre) broad, and three-quarters of an inch (0.019 metre) high. *Tunic* of fine silky reticulated fibre. *Basal Tunic* of radiating unbranched fibres; the *Cap* produced at the summit of the corm into bunches of fibres about half an inch (0.013 metre) in length.

Sheathing Leaves six or seven, from half an inch (0.013 metre) to three and a half inches (0.088 metre) in length, reaching to the level of the proper spathe.

Proper Leaves five or six, appearing with the flowers and reaching to the level of the throat at the flowering-time, produced in the spring to a length of fifteen inches (0.375 metre), $\frac{1}{12}$ of an inch (0.0021 metre) broad, ciliated on the margins of the blade and keel; the lateral channels narrow, the reflected margins of the blade nearly meeting the margins of the keel; the keel about half the width of the blade.

Basal Spathe about two inches (0.050 metre) long, including several scapes. *Proper Spathe* diphyllous, from three to four inches (0.075—0.100 metre) in length, reaching to the level of the sheathing leaves.

Perianth: Tube from three to four inches (0.075—0.100 metre) in length from the ovary to the throat. *Throat* bearded, white or purple, and orange in var. *chrysobelonicus*. *Segments* ovato-lanceolate, an inch and a half (0.038 metre) long, and two-thirds of an inch (0.017 metre) broad, pure white, or purple towards the base.

Stamens falling short of the pistil, about three-quarters of an inch (0.019 metre) in height; the tapering orange *Anthers* three times the length of the short white *Filament*. *Pollen Grains* slightly papillose, yellow, irregular in form, about $\frac{1}{450}$ of an inch (0.00006 metre) in diameter.

Pistil about an inch (0.025 metre) in height, exceeding the stamens; the *Style* dividing at the level of the middle of the anthers, and produced into entire scarlet stigmata.

Scape an inch (0.025 metre) in height at the flowering-time.

Capsule and *Seed* unknown.

Crocus hadriaticus is a native of Albania, the Ionian Islands, and the Morea; it probably extends as far east as the Island of Syra in the Ægean Sea. A Crocus sparingly collected there on different occasions by Mr. Elwes and myself, seems referable to this species. Its area of distribution would lie between $36\frac{1}{2}^{\circ}$ and 40° north latitude, and $20\frac{1}{2}^{\circ}$ and $24\frac{1}{2}^{\circ}$ east longitude. Herbert records it from the hill of Bisdun, in Epirus, where the ancient Dodona once stood; from near Janina (Joánnina) in Epirus; and var. *chrysobelonicus* from the hill of Chrysobeloni, in Santa Maura. I also found it throughout the northern part of Santa Maura, near the Convent of Phaneromia, on the hill to the north-west of Sphakiotes, on the flanks of Scarus, and in other places. Dr. Heldreich sent me specimens of this species, gathered on Mount Omplo (Voidhia?), near Patras. I cannot satisfy myself that *C. peloponnesiacus* of Orphanides, gathered at an altitude of three thousand feet on Monte Malevô, near Ajanni (Hajios Joannis), in the Peloponnesus, is separable from *C. hadriaticus*. Dr. Heldreich has favoured me with Professor Orphanides' type specimens; in these the flowers appear to be pure white; the leaves, though scarcely visible at the flowering-time, are not dormant, as in the case of some autumnal species, but just appear above the sheathing-leaves with the flowers in October. Some corms collected for me by Mr. C. C. Lacaita, on Monte Malevo, produced white flowers accompanied by leaves in October, 1884 and I see nothing to distinguish the plant from *C. hadriaticus*.

C. hadriaticus is closely allied to *C. sativus* and I can detect no satisfactory

CROCUS HADRIATICUS, *Herbert.*

Figs. 1 & 2 var. Saundersianus, Herbert.

Fig. 3 var. chrysobelonicus, Herbert.

distinguishing point, except the colour of the flowers; indeed Herbert, in the *Botanical Register* of 1845, described the Santa Maura plant as a variety of *C. Cartwrightianus*. *(sativus, var. Cartwrightianus.)*

REFERENCES TO PLATE XXX.

Fig. 1. Flowering-state of var. *Saundersianus*, October 1st, actual size.
Fig. 2. Interior of segment, actual size.
Fig. 3. Flower of var. *chrysobelonicus* from Santa Maura, actual size
Fig. 4. Vernal state, June 16th, with matured leaves, actual size.
Fig. 5. Diagrammatic dissection of scape, ovary, and spathes, actual size.
Fig. 6. Stamens and Pistil, magnified two-fold.
Fig. 7. Pollen Grain, magnified one hundred and fifty-fold.
Fig. 8. Stigmata, magnified six-fold.
Fig. 9. Base of corm, actual size.
Fig. 10. Corm tunics, magnified two-fold: *a*, main tunic; *b*, basal tunic.
Fig. 11. Margin of leaf and lateral channel, magnified fifty-fold.
Fig. 12. Section of leaf, magnified six-fold: *c*, February; *d*, June.

DIVISION II.—NUDIFLORI.

Species without a basal spathe.

Section I.—RETICULATI.

Species with a corm tunic of distinctly reticulated fibres.

Autumn Flowering.—

31. C. cancellatus.

Spring Flowering.—

32. veluchensis.
33. Sieberi.
34. dalmaticus.
35. reticulatus.
36. susianus.
37. stellaris.
38. ancyrensis.
39. gargaricus.
40. Gaillardotii.
41. carpetanus.

Zebel, from the south, with the range of the Bulgar Dagh.
From a drawing by C. G. Danford, Esq.

31. CROCUS CANCELLATUS.

Section: Nudiflori; reticulati *(Herbert)*: Schizostigma; autumnal *(Baker)*.

Crocus cancellatus, Herbert in Bot. Mag. 1841, sub. tab. 3864, sp. 10; in Bot. Reg. 1843, vol. xxix, Misc. p. 30; 1845, vol. xxxi, Misc. p. 3; 1847, vol. xxxiii, tab. 16 (17), fig. 4; Hist. Crocus, sp. 29, p. 30; from Journ. Hort. Soc. Lond., vol. ii, p. 276; and two drawings Lindl. Libr. R. Hort. Soc. Lond.; Tchihatcheff, Asie Min., part iii, Bot., vol. ii, p. 522; Klatt, Revis. Irid. in Linnæa, vol. xxxiv, pp. 687 and 721; Baker, Rev. Sp. Crocus in Gard. Chron. 1873, p. 1533; and List Crocus in Journ.

R. Hort. Soc. Lond., new ser., 1877, vol. iv, sp. 42; Dyer in Bot. Mag. 1874, tab. 6103; G. Maw Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, p. 462; in The Garden, vol. xxi, No. 532, p. 68; and Hist. Crocus in Journ. Linn. Soc., Bot., vol. xix, p. 373; Boiss., Fl. Orient, vol. v, part i, p. 101.

C. Schimperi, Gay in Schimp. Pl. Cephal. exsic; and drawing, Bibl. J. D. Hooker; Baker in Journ. Linn. Soc., Bot., vol. xvi, p. 84.

C. Spruneri, Boiss. and Heldr. in Boiss. Diagn., ser. i, vii, p. 102.

C. dianthus, K. Koch in Linnæa, vol. xxi, p. 634; Tchihatcheff, Asie Min., part iii, Bot., vol. ii, p. 524.

C. nudiflorus (not *C. nudiflorus*, Smith), Sibth. & Smith, Prod. Fl. Græc., p. 23 (excl. syn.).

Var. 1. *cilicicus*, G. Maw in Gard. Chron. Feb. 1st, 1879, p. 234; and Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, p. 462.

C. cilicicus, Kotschy, Pl. Cilic. exsic., No. 316.

C. cancellatus, var. 1. *Kotschyanus*, Herbert, Hist. Crocus, sp. 29, var. 1, p. 30; from Journ. Hort. Soc. Lond., vol. ii, p. 276. (Not *C. Kotschyanus* of K. Koch, Index Sem. Hort. Berol., of Tchihatcheff, Asie Min., and of Baker, List Crocus in Journ. R. Hort. Soc. Lond., and Journ. Linn. Soc., Bot., vol. xvi, which is *C. zonatus* of Gay.)

C. pylarum cilicicarum, Gay in Balansa Pl. Orient. exsic., No. 822.

C. pylarum, Tchihatcheff, Asie Min., part iii, Bot., vol. ii, p. 525.

C. damascenus, Herbert in Bot. Reg. 1845, vol. xxxi, tab. 37, fig. 1 and Misc. p. 1; and Hist. Crocus, sp. 30, p. 31; from Journ. Hort. Soc. Lond., vol. ii, p. 277; Baker, Rev. Sp. Crocus in Gard. Chron. 1873, p. 1466; List Crocus in Journ. R. Hort. Soc. Lond., new ser., 1877, vol. iv, sp. 35; and Syst. Iridac. in Journ. Linn. Soc., Bot., vol. xvi, p. 84.

C. cancellatus, var. *β damascenus*, Boiss. Fl. Orient., vol. v, part 1, p. 101.

C. cancellatus, var. *persicus*, Chappellier, note "sur un crocus recueilli en Perse."

C. edulis, Boiss. and Blanche, Fl. Syr. exsic.

Var. 2. *Mazziaricus*, Herbert in Bot. Reg. 1845, vol. xxxi, Misc. p. 3, and Misc. p. 82; 1847, vol. xxxiii, tab. 16 (17), var. 3, figs. 5 and 6; and Hist. Crocus, sp. 29, var. 3, p. 31, from Journ. Hort. Soc. Lond., vol. ii, p. 277; G. Maw, Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, p. 462; in The Garden, vol. xxi, No. 532, p. 68.

Cormus circiter 1 poll. (0.025 metr.) latus, paullo latior quam altior. Tunicæ fibri validuli reticulati, reticulationes oblongæ rectangulares, pileus in fasciculo fibrorum validorum productus 1 poll (0.025 metr.) et ultra supra apicem cormi. Tunica basalis, discus vel annulus validus cartilagineus, radiis fibrosis validis acutis cinctus. Vaginæ spatha subæquantes vel longiores. Folia ad florationem visa $\frac{1}{12}$ poll. (0.0021 metr.) lata, ferme glabra, matura 10—12 poll. (0.250—0.300 metr.) longa, costæ tres elevatæ in canaliculis lateralibus. Spatha membranacea, diphylla, celata vel ferme celata in vaginis. Perianthium: faux flava glabra; segmenta $1\frac{1}{2}$—$1\frac{3}{4}$ poll. (0.038—0.044 metr.) longa, $\frac{1}{2}$ poll. (0.013 metr.) lata, alba vel pallide purpurea, concolora vel signis purpureis penniformibus ornata, sæpius flava apud faucem. Antheræ pallide aurantiacæ acuminatæ, quam filamenta alba bis longiores. Stylus aurantiacus paullo infra apices antherarum fissus. Stigmata ramulosa aurantiaca antheras multo superantes. Semina magna, subsphærica rubra.

Corm about an inch (0.025 metre) broad and high. *Tunic* of strong reticulated fibre, the interspaces being oblong and rectangular; the *Cap* produced into a bunch of strong fibres reaching an inch (0.025 metre) or more above the summit of the corm; the *Basal Tunic* a coriaceous disc or ring surrounded by strong pointed fibrous rays.

CROCUS CANCELLATUS, *Herbert.*

C. Schimperi, Gay. C. Spruneri, Boiss. & Held.

Sheathing Leaves about four, from half an inch (0.013 metre) to three or four inches (0.075—0.100 metre) in length; as long as or exceeding the length of the proper spathes.

Proper Leaves four or five, glabrous, just appearing beyond the sheathing leaves at the flowering-time, and produced in the spring to a length of ten or twelve inches (0.250—0.300 metre), one-twelfth of an inch (0.0021 metre) broad; the keel prominent, one-fourth the width of the blade, the open lateral channels containing three prominent ridges.

Proper Spathe diphyllous, two inches (0.050 metre) long in the type, shorter in var. *cilicicus*.

Perianth: Tube four or five inches (0.100—0.125 metre) in length from the ovary to the throat. *Throat* unbearded, yellow. *Segments* from an inch and a half (0.038 metre) to an inch and three-quarters (0.044 metre) long, and half an inch (0.013 metre) broad; varying from white to light purple, self-coloured or feathered with purple markings.

Stamens about five-eighths of an inch (0.016 metre) long, falling short of the pistil; the *Anthers* hastate, tapering upwards, orange, about twice the length of the white *Filament*. *Pollen Grain* $\frac{1}{400}$ of an inch (0.00006 metre) in diameter, papillose, orange.

Pistil an inch and a quarter (0.032 metre) in height, much exceeding the stamens; the *Style* dividing at the level of the summit of the anthers, and produced into a compact bunch of finely divided orange stigmata.

Scape at the flowering-time an inch (0.025 metre) high, produced in the spring at the maturity of the capsule, to a height of three inches (0.075 metre). According to Herbert, several scapes and simultaneous flowers occur.

Capsule about an inch (0.025 metre) in length, and half an inch (0.013 metre) broad.

Seed one-fifth of an inch (0.0050 metre) high, and one-seventh of an inch (0.0036 metre) broad, slightly papillose, rose coloured, ripening to dull red; the prominent raphe, chalaza and caruncle of the same colour as the body of the seed.

Crocus cancellatus, first described by Herbert in 1841, has since been known under several names, the variable flower-colouring suggesting specific distinction. But in tracing these variations from the eastern to the western limits of its distribution, it is impossible to draw any distinct line. It ranges through 29 degrees of longitude, from the Ionian Islands, longitude $20\frac{1}{2}^{\circ}$ east, to north-west Persia, longitude $49\frac{1}{2}^{\circ}$ east; and through 8 degrees of latitude, from northern Palestine, latitude 33° north, to Armenia and the northern part of Asia Minor, latitude 41° north. The white and pale varieties prevail at the western limit of distribution, whilst the eastern forms are blue with various markings. The variety from the Bithynian Olympus is coloured exactly like *C. aërius*, with which it grows. I do not think that Herbert's *damascenus*, Gay's *pylarum*, *C. edulis* of Boissier and Blanche, and Kotschy's *cilicicus*, can be properly separated from the other blue forms, and I therefore place them all under the name of *cilicicus*, as a variety only, of Herbert's *cancellatus*. The proper spathes are shorter in *cilicicus* than in the Greek plant, and are completely hidden by the sheathing leaves. In the var. *Mazziaricus*, of Herbert, the flowers are white with a bright golden orange throat. Herbert records it from near Carea, on the heights of Megaoros, on an elevated hollow and flat between the highest point of Megaoros and St. Elias, near Diamigliano and on Phanoromani

in Santa Maura, where, in October 1877, I found it abundantly, and also in other parts of the Island. Herbert gathered it on Mount Ruthi and in the short turf near the Governor's villa in the forest of Cephalonian Firs, on Mount Œnos (now called Megaoros) in Cephalonia, and states that it has not been found in Corfu and Zante.

In the Greek plant, which I take as the type, the flowers are generally pale lilac, more or less veined with purple. It occurs on hills near Nauplia, at the base of Mount Delphi in Negropont, and on Mount Hymettus, near Athens, where I gathered it abundantly in the spring of 1877. The varieties from Asia Minor which I group under the name of *cilicicus*, are for the most part clear blue, though Herbert refers to some varieties of a pale bluish tint, also to some almost white from the Taurus north of Tarsus. All the herbarium specimens I have seen from that district are distinctly blue. The blue form *cilicicus* has been recorded from the following localities in the Cilician Taurus: upper parts of the mountains overlooking the defile of the Kulek Boghas or Pylæ Ciliciæ; on a small elevated flat on the summit of the Bulgar Dagh at an altitude of seven thousand five hundred feet, one mile north of the lead mines and twelve miles from the Pylæ Ciliciæ; abundant on southern declivities towards Dasch Olug, Tschidem, Goli and Bulgar; Magara Aquiloni, at an altitude of eight thousand feet, flowering from the end of August and throughout September; above Bulgar Maden, and near Güllek Magara, at altitudes of from seven thousand to eight thousand feet.

Some corms collected for me near Aleppo by Mr. Henderson, H.M. Consul, appear to be those of this plant. In the Lebanon, and the neighbourhood of Damascus, it is so abundant that the corms are collected for food. Sir J. D. Hooker collected it on the Lebanon on September 28th, at an altitude of six thousand feet. Gaillardot, in November and December, at Maraka, Anti-Libanus, and on hills between Sahara and Dimas; and Blanche between Beyrout and Damascus; also between Yammûnch and Dimani; and above Edon. It also occurs at Jedeideh Anti-Libanus, at an altitude of four thousand five hundred feet. Mr. T. S. Jago, H.M. Vice-Consul at Damascus, found it close to the Cedars at a height of about six thousand feet.

There is no record of its having been found in the little known district of Kurdistan; but its recent discovery in north-west Persia suggests the probability of its also occurring there between Syria and Persia. Monsieur Pissard, gardener-in-chief to the Shah of Persia, collected it at an altitude of thirteen hundred metres in the plains and hills of Sultabatt (Sultanabad), in the province of Irath-Férahan (Feraghan), south-east of Amadan (Hamadan), about one hundred and twenty kilometres from Téhéran. Monsieur Chappellier, of Paris, to whom I am indebted for two corms of the Crocus, has favoured me with a copy of a short printed notice

CROCUS CANCELLATUS, *Herbert, var.* CILICICUS.

C. cilicicus, Kotschy. C. damascenus, Herbert. C. Kotschyanus, Herbert. C. pylarum, Gay. C. edulis, Boiss. & Blanche.

of the plant. The notice was published in Paris in April, 1882. He describes the flower as white, lilac, or violet, the throat being white or violet, instead of yellow as in the type. The corms are evidently those of *C. cancellatus*, the tunic of which is distinct from that of any other species.

C. cancellatus has a great range of altitude: on the flanks of Phanoromani in Santa Maura, it is abundant within six hundred feet of the sea level, and in the Taurus occurs up to a height of eight thousand feet. Its flowering-time extends from the beginning of September to December. It is a robust species, easy of cultivation.

REFERENCES TO PLATE XXXI.

Fig. 1. Flowering-state, November 29th, actual size; *a*, *c*, from Santa Maura; *b*, from Mount Hymettus, Athens; *d*, inner surface of segments, actual size.
Fig. 2. With matured leaves and capsule, June, actual size.
Fig. 3. Diagrammatic dissection of scape, ovary and spathes, actual size.
Fig. 4. Stigmata, magnified two-fold.
Fig. 5. Stamens and Pistil, magnified two-fold.
Fig. 6. Stigmata, magnified six-fold.
Fig. 7. Pollen Grain, magnified one hundred and fifty-fold.
Fig. 8. Section of leaf, magnified twelve-fold.
Fig. 9. Capsule of var. from the Bithynian Olympus, actual size.
Fig. 10. Seed, magnified six-fold.
Fig. 11. Corm tunics, magnified two-fold: *c*, main tunic; *f*, basal tunic.

REFERENCES TO PLATE XXXI—*b*. Var. *cilicicus*.

Fig. 1. Flowering-state, October 30th, actual size.
Figs. 2, 3. Outer surface of segments, November 15th, actual size.
Fig. 4. With matured leaves and capsule, June, actual size.
Fig. 5. Diagrammatic dissection of scape, ovary and spathes, actual size.
Fig. 6. Stamens and Pistil, magnified two-fold.
Fig. 7. Pollen Grain, magnified one hundred and fifty-fold.
Fig. 8. Stigmata, magnified six-fold.
Fig. 9. Section of leaf, magnified twelve-fold.
Fig. 10. Corm tunics, magnified two-fold: *a*, cap; *b*, portion of main tunic; *c* and *d*, basal tunics.
Fig. 11. Seed, magnified six-fold.

32. CROCUS VELUCHENSIS.

Section: Nudiflori; reticulati *(Herbert)*: Holostigma; vernal *(Baker)*.

Crocus veluchensis, (not *C. veluchensis* of Baker, in Bot. Mag. tab. 6197, which is *C. banaticus*, Heuffel,) Herbert, in Bot. Reg. 1845, vol. xxxi, Misc. 72; 1847, vol. xxxiii, tab. 4, fig. 3; and Hist. Crocus, sp. 27, p. 28; from Journ. Hort. Soc. Lond., vol. ii, p. 274; G. Maw, Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, p. 462; in The Garden, vol. xxi, No. 532, p. 68; and Hist. Crocus in Journ. Linn. Soc., Bot., vol. xix, p. 373; Boiss. Fl. Orient., vol. v, part i, p. 103.

C. Sieberi, var. *veluchensis*, Baker, Rev. Sp. Crocus in Gard. Chron. 1873, p. 542; List Crocus in Journ. R. Hort. Soc. Lond., new ser., vol. iv, 1877; and Syst. Iridac. in Journ. Linn. Soc., Bot., vol. xvi, p. 82.

C. balcanensis, Janka, Pl. Nov. Turc. Brev., p. 8.

C. thessalus, (not *C. thessalus*, Boiss. Diag. ser. i, xiii, p. 17, which is *C. Sieberi*, Gay), Janka, exsic. Kalofer Thrace.

? C. Pallasii, (not *C. Pallasii* M. B.), Griseb. Spic. Fl. Rumel.

C. nivalis, Sprunner, exsic.

Cormus $\frac{1}{3}$—$\frac{1}{2}$ poll. (0.0084—0.013 metr.) latus, $\frac{1}{2}$ poll. (0.013 metr.) altus. Tunicæ fibri tenues dissoluti reticulati, ad apicem cormi in fasciculo cuspidum fibrosorum, $\frac{1}{3}$ poll. (0.0084 metr.) longa. Vaginæ quam spatha breviores. Folia circiter 3, $\frac{1}{5}$ poll. (0.0050 metr.) lata, ad florationem (in Maio) fauce superantia, carina angusta glabra, canaliculis lateralibus, latis, apertis. Spatha diphylla, fauce poll. brevior. Perianthium: faux purpurea, intus alba, barbata; segmenta omnino splendide purpurea, $1\frac{1}{2}$—$1\frac{3}{4}$ poll. (0.038—0.044 metr.) longa, $\frac{1}{2}$ poll. (0.013 metr.) lata. Antheræ aurantiacæ filamentis albis æquantes. Stylus ad apices antherarum fissus. Stigmata compacta fimbriata aurantiaca, antheras superantia.

Corm (wild specimen) from a third of an inch (0.0084 metre) to half an inch (0.013 metre) broad, and half an inch (0.013 metre) high. *Tunic* of fine reticulated fibre, produced at the summit into a bunch of fibres about a third of an inch (0.0084 metre) high.

Sheathing Leaves three or four, falling short of proper spathe, from half an inch (0.013 metre) to two inches (0.050 metre) high.

Proper Leaves three, reaching above the level of the throat at the flowering-time in May, one-fifth of an inch (0.0050 metre) broad, glabrous, the keel one-fifth the width of the blade, the lateral channels broad and open.

Proper Spathe diphyllous, about two inches (0.050 metre) in length, exceeding the sheathing leaves, and reaching nearly to the throat.

Perianth: Tube two, to two and a half inches (0.050—0.063 metre) in length from the ovary to the

throat. *Throat* purple, bearded. *Segments* an inch and a half to an inch and three-quarters (0.038—0.044 metre) long, and half an inch (0.013 metre) broad, uniform pale purple.

Stamens an inch (0.025 metre) in height; the yellow *Anthers* half an inch (0.013 metre) long, almost equalling the white *Filament*.

Pistil exceeding the stamens, an inch and a quarter (0.032 metre) in height from the throat; the *Style* dividing at the level of the summit of the anthers, and produced into a compact mass of fringed orange stigmata.

Scape at the flowering-time an inch and a quarter (0.032 metre) in length.

Capsule and *Seed* unknown.

Crocus veluchensis occurs generally at high elevations in the mountains of Greece and Turkey, between latitude 38° 30′ and 42° 40′ north, and longitude 21° 45′ and 24° 30′ east, and seems to take the place of *Crocus vernus* in central and western Europe. It has been recorded from Mount Parnassus; Mount Corax, at elevations of from six thousand to seven thousand feet; the summit of Tymphrestus (Velugo, Veluchi, Veluki) in Ætolia; and was gathered by Janka on the 31st. of May, 1871, amongst the melting snow in the upper regions of the Balkans (Hœmus), above the village of Kalofer, in Northern Thrace, and distributed by him as *C. thessalus*. *C. thessalus*, of Boissier is however identical with *C. Sieberi*, of Gay.

In its general aspect *C. veluchensis* resembles *C. vernus*, except that the flowers are always of a clear purple colour. The absence of a basal spathe, and its diphyllous proper spathe, distinguish it from *C. vernus*, and its purple throat from *C. Sieberi*.

C. veluchensis has not yet been introduced to cultivation; but herbarium specimens have been liberally distributed by V. von Janka.

REFERENCES TO PLATE XXXII.

Fig. 1. Flowering-state, May 31st, from wild specimens, Kalofer, Thrace, actual size.
Fig. 2. Diagrammatic dissection of scape, ovary, and spathes, actual size.
Fig. 3. Stamens and Pistil, magnified two-fold.
Fig. 4. Stigmata, magnified six-fold.
Fig. 5. Corm Tunic, magnified two-fold.
Fig. 6. Section of leaf, magnified six-fold.

Fig. 1, May 31st

CROCUS VELUCHENSIS, *Herbert.*

C. balkanensis, Janka.

J. Maw del. F. Huth, Lith^r Edin^r

33. CROCUS SIEBERI.

Section: Nudiflori; reticulati *(Herbert)*: Holostigma; vernal *(Baker)*.

Crocus Sieberi, Gay in Féruss. Bull. Sc. Nat. vol. xxv, p. 320 (220); Vis. Flora Dalmat. vol. ii, p. 29; Tchihatcheff, Asie Min., part iii, Bot., vol. ii, p. 523; J. D. Hooker in Bot. Mag. 1873, tab. 6036; Baker, Rev. Sp. Crocus in Gard. Chron. 1873, p. 542; List Crocus in Journ. R. Hort. Soc. Lond., new ser., vol. iv, 1877; and Syst. Iridac. in Journ. Linn. Soc., Bot., vol. xvi, p. 81; G. Maw, Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, p. 462; in The Garden, vol. xxi, No. 532, p. 68; and Hist. Crocus in Journ. Linn. Soc., Bot., vol. xix, p. 373; Boiss., Fl. Orient., vol. v, part i, p. 102.

Crocus Sieberi, var. *atticus*, Boiss. and Orphan. in Boiss. Diag. Pl. Nov. Orient., Ser. 2, iv, p. 94.

C. Sieberianus, Herbert in Bot. Mag. sub. tab. 3866.

C. nivalis, Bory and Chaub. Exped. Morée, vol. ii, p. 21, tab. 2, fig. 1; Herbert in Bot. Reg. 1847, vol. xxxiii, tab. 4, fig. 2; Hist. Crocus, sp. 28, p. 28, from Journ. Hort. Soc. Lond., vol. ii, p. 274; and drawing Lindl. Libr. R. Hort. Soc. Lond.; Klatt, Revis. Irid. in Linnæa, vol. xxxiv, p. 682 and 720; Floral Mag. 1874, plate iii, fig. 2.

C. sublimis, Herbert in Bot. Reg. 1845, vol. xxxi, Misc. p. 81, No. 73.

C. Sibthorpianus, Herbert in Bot. Reg. 1845, vol. xxxi, Misc. p. 28.

C. thessalus, (not *C. thessalus*, Janka, Exsic. Kolafer, Thrace, which is *C. veluchensis*, Herbert), Boiss. Diag., Ser. i, xiii, p. 17.

Crocus vernus (not *C. vernus*, Allione), Smith, Prodr. i, p. 34, ex parte non L.

Var. *versicolor* (not *C. versicolor*, Gawl), Boiss. and Heldr., Boiss. Fl. Orient., vol. v, part i, p. 103; G. Maw, Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, p. 462; in The Garden, vol. xxi, No. 532, p. 68.

Cormus $\frac{2}{3}$—1 poll. (0.017—0.025 metr.) latus, $\frac{1}{2}$—$\frac{2}{3}$ poll. (0.013—0.017 metr.) altus. Tunica reticulationibus tenuibus rhombeis confecta. Tunica basalis magna fibris radiatis haud ramosis confecta. Vaginæ quam spatha breviores. Folia ad florationem floribus æquantia glabra, $\frac{1}{4}$ poll. (0.0063 metr.) lata; canaliculi aperti ecostati. Spatha diphylla. Perianthium: faux haud barbata, aurantiaca; segmenta $1\frac{1}{2}$—$1\frac{3}{4}$ poll. (0.038—0.044 metr.) longa, circiter $\frac{1}{2}$ poll. (0.013 metr.) lata, forma coloreque valde variabilia. Antheræ aurantiacæ sursum acuminatæ, filamentis aurantiacis bis æquantes. Stylus fissus sub apices antherarum; stigmata lata subintegra aurantiaco-coccinea, antheris subæquantia. Semina glabra polita ferme sphærica rubra.

Var. *versicolor*, segmenta alba vel purpurea, striis, et maculis penniformibus varie ornata, basi semper aurea.

Corm about two-thirds of an inch (0.017 metre), broad and high. *Tunic* of finely reticulated fibre, with

rhombic interspaces; the *Cap* fibro-membranous, produced at the summit into a short bunch of fibres. The *Basal Tunic* of a large radiating mass of unbranched fibres differing from the basal tunic of any other species.

Sheathing Leaves three to four, from half an inch (0.013 metre) to three inches (0.075 metre) in length, falling short of the proper spathes.

Proper Leaves four or five, appearing with the flowers, and reaching to their level, produced at maturity to a length of eight or nine inches (0.200—0.225 metre), one-quarter of an inch (0.0063 metre) broad, glabrous; the keel one-third the width of the blade, the lateral channels wide and open.

Perianth: Tube three to four inches (0.075—0.100 metre) in length from the ovary to the throat. *Throat* unbearded, orange. *Segments* one and a half to one and three-quarters inches (0.038—0.044 metre) in length, and about half an inch (0.013 metre) in width. In the type pale purple, orange towards the throat; and in var. *versicolor*, variegated with white, purple, and orange, or white and orange.

Stamens from three-quarters of an inch (0.019 metre) to an inch (0.025 metre) in height; the orange *Anther* somewhat longer than the orange *Filament*. *Pollen Grain* papillose, orange, $\frac{1}{300}$ of an inch (0.0008 metre) in diameter.

Pistil about an inch (0.025 metre) in height from the throat; the *Style* dividing at the level of the middle of the anthers, and produced into broad, sub-entire, orange-scarlet stigmata, which reach to the level of the summit, or a little above the summit of the anthers.

Scape from an inch and a half to two inches (0.038—0.050 metre) high at the flowering-time, produced to a height of four inches (0.100 metre) at the maturity of the capsule; there are one, two, or three scapes within each set of sheathing leaves.

Capsule about an inch (0.025 metre) high, and one-third of an inch (0.0084 metre) broad.

Seed dull red, about one-seventh of an inch (0.0036 metre) high, and one-tenth of an inch (0.0025 metre) broad, slightly papillose; the prominent caruncle is of the same colour as the body of the seed; the raphe is thickened into a prominent white strophiole.

Crocus Sieberi is abundant, generally at elevations of from fifteen hundred to seven thousand five hundred feet, on the mountains of Greece, the Morea, Eubœa, Crete, and the Cyclades. Visiani, on the authority of Maly, records its occurrence in Montenegro; and Herbert, on the authority of Forbes and Sprat, in Lycia. Omitting the two latter records, concerning which some doubt exists, the ascertained range of the species would lie between 21° 50′ and 24° 50′ east longitude, and 35° 10′ and 38° 35′ north latitude. On the mainland of Greece it has been found on Mount Parnassus (Liakoura), Mount Parnes (Ozea), Pentelicus and Corydalus, near Athens. In Eubœa, on Mount Delphi; and in the Morea, on Taygetus (Tageytes) and on Mount Voidia (Panachaïco), near Patras. Herbert states that Forbes and Sprat gathered it on Mount Massicytus, above the Gailahs, (or flat table-lands of the Lycian Mountains,) and on Mount Lycodino near the Forest of Kubaz; but there is no other or recent record of its occurrence in Asia Minor.

Crocus Sieberi flowers freely in the early spring. The type, or self-coloured form, from the mainland of Greece (Fig. 1), has been for some years in cultivation. The variety *versicolor* is an extremely beautiful plant, the segments being variously striped like a piccotee, with purple and white, which blend into the bright orange of the throat. It was introduced to cultivation by Mr. Elwes, who received it from

Fig. 3, March 13th

Fig. 9, June 26th

CROCUS SIEBERI, *Gay.*

C. nivalis, Bory & Chaubard. C. Sieberianus, Herbert.
C. sublimis, Herbert. C. Sibthorpianus, Herbert. C. thessalus, Boissier & Spruner.
Figs 3-8 var. VERSICOLOR, *Boissier & Heldreich.*

Mr. J. B. Sandwith, C.B., Her Majesty's Consul at Canea, in Crete. I am also indebted to Mr. Sandwith for a further supply of the corms, collected at an elevation of seven thousand five hundred feet on the White Mountains, Crete.

The type or self-coloured form is prevalent on the Greek mainland, and the variegated variety on the islands of the Archipelago.

C. Sieberi is readily distinguished from *C. veluchensis* by its unbearded, bright orange throat.

REFERENCES TO PLATE XXXIII.

Fig. 1. Flowering-state, February 20th, actual size.
Fig. 2. Inner surface of segment, actual size.
Fig. 3. Flowering-state of var. *versicolor*, March 13th, actual size.
Figs. 4, 5, 6, 7, and 8. Segments of var. *versicolor*, actual size.
Fig. 9. With matured leaves and capsule, June 26th, actual size.
Fig. 10. Diagrammatic dissection of scape, ovary and spathes, actual size.
Figs. 11, 12. Stamens and Pistil, magnified two-fold.
Fig. 13. Pollen Grain, magnified one hundred and fifty-fold.
Fig. 14. Stigmata, magnified six-fold.
Fig. 15. Section of leaf, magnified six-fold.
Fig. 16. Corm tunics, magnified two-fold: *a*, cap; *b*, main tunic; *c*, basal tunic.
Fig. 17. Seed, magnified six-fold.

34. CROCUS DALMATICUS.

Section: Nudiflori; reticulati *(Herbert)*: Holostigma; vernal *(Baker)*.

Crocus dalmaticus, (not *C. versicolor*, var. *dalmaticus*, Herbert in Bot. Mag., sub. tab. 387) Vis. Fl. Dalmat., vol. i, No. 217, p. 119; vol. ii, p. 28, Suppl. tab. 2; G. Maw, Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, p. 462; in The Garden, vol. xiv, p. 420; and vol. xxi, No. 532, p. 68; and Hist. Crocus in Journ. Linn. Soc., Bot., vol. xix, p. 373.

C. reticulatus, var. 2, *dalmaticus*, Herbert, Hist. Crocus, sp. 32, var. 3, p. 33; from Journ. Hort. Soc. Lond., vol. ii, p. 279; Baker, Rev. Sp. Crocus in Gard. Chron., 1873, p. 542; List Crocus in Journ. R. Hort. Soc. Lond., new ser., vol. iv, 1877; and Syst. Iridac. in Journ. Soc., Bot., vol. xvi, p. 82.

Cormus $\frac{1}{2}$—$\frac{5}{8}$ poll. (0.013—0.016 metr.) latus atque altus, pyriformis. Tunicæ fibri validuli reticulati in fundamento membranaceo, tenuiores quam in sequente *C. reticulato*. Vaginæ quam spatha breviores. Folia glabra, fauce ad florationem æquantia, $\frac{1}{8}$ poll. (0.0032 metr.) lata, matura 8—9 poll. (0.200—0.225 metr.) longa. Spatha diphylla. Perianthium: faux flava glabra; segmenta circiter $1\frac{1}{2}$ poll. (0.038 metr.) longa, et $\frac{3}{8}$—$\frac{1}{2}$ poll. (0.010—0.013 metr.) lata, acuminata, sæpius omnino lilacina, vel ochrea striis penniformibus purpureis extus ornata. Antheræ flavæ, filamentis albis vel flavescentibus bis æquantes. Stylus supra antheras fissus; stigmata integra aurantiaca patentia. Semina ochrea.

Corm pyriform, from half an inch (0.013 metre) to five-eighths of an inch (0.016 metre) broad and high. *Tunic* of strong reticulated fibre on a membranous base; the terminal fibres of the main tunic attached to the centre of the bottom of the corm, a separate *Basal Tunic* being absent.

Sheathing Leaves about three, from half an inch (0.013 metre) to two inches (0.050 metre) in length, falling short of the proper spathe.

Proper Leaves from three to six, reaching at the flowering-time nearly to the level of the throat, and produced to a length of eight or nine inches (0.200—0.225 metre) at maturity, one-eighth of an inch (0.0032 metre) broad, glabrous, the keel convex, one-third the width of the blade.

Proper Spathe diphyllous, nearly two inches (0.050 metre) in height, tubular, exceeding the sheathing leaves, and reaching to within an inch (0.025 metre) of the throat.

Perianth: Tube about two inches (0.050 metre) in length from the ovary to the throat. *Throat* unbearded, yellow. *Segments* about an inch and a half (0.038 metre) long, and from three-eighths to half an inch (0.010—0.013 metre) broad, generally self-coloured lilac; the outer surface of the outer segments buff, with a few purple veins towards the base, or delicately feathered with purple.

Stamens about three-quarters of an inch (0.019 metre) in height; the yellow divergent *Anthers* about twice the length of the white or yellowish *Filament*. *Pollen Grains* glabrous, yellow, $\frac{1}{300}$ of an inch (0.00008 metre) in diameter.

Pistil about an inch (0.025 metre) in height from the throat; the *Style* dividing at the level of the summit of the anthers, and shortly produced into entire, orange, spreading stigmata.

Scape an inch and a half (0.038 metre) in height at the flowering-time, and produced to a height of from three to three and a half inches (0.075—0.088 metre) at the maturity of the capsule.

Capsule three-quarters of an inch (0.019 metre) long, and one-third of an inch (0.0084 metre) broad.

Seed one-seventh of an inch (0.0036 metre) high, and one-tenth of an inch (0.0025 metre) broad, glabrous; the prominent raphe and caruncle of a paler colour than the body of the seed.

Crocus dalmaticus of Visiani must not be confounded with the Dalmatian forms of *C. biflorus* and *C. vernus*, both of which have had the name applied to them. Though allied to the following species *(C. reticulatus)*, it appears to be quite distinct, and is a much more robust plant in cultivation, flowering freely in the open border in February and March. It is a common plant in the mountains of Dalmatia, and has been recorded from Mount Vermaz, near Cattaro; Bossanka, near Ragusa. From the Island of Lesina, where a white variety occurs; and Zara (Zada). The Kew Herbarium contains specimens collected in the Herzegovina on the 12th of March, 1857, by Mr. G. Zohrab. It has also been recorded from the neighbourhood of Trieste, but there is some doubt whether it extends so far north. Its main range of latitude is between 42° and 44½° north; and of longitude, between 15° and 19° east. I have not been able to detect any separate basal tunic in *C. dalmaticus*, though a prominent feature in *C. reticulatus*, the main tunic is directly articulated to the centre of the base of the corm.

REFERENCES TO PLATE XXXIV.

Fig. 1. Flowering-state, February 23rd, actual size.
Fig. 1. *a*, Inner surface of segment; *b*, outer surface of segment of feathered variety, actual size.
Fig. 2. With matured leaves and capsule, June 11th, actual size.
Fig. 3. Diagrammatic dissection of scape, ovary, and spathes, actual size.
Fig. 4. Stamens and Pistil, magnified two-fold.
Fig. 5. Pollen Grain, magnified one hundred and fifty-fold.
Fig. 6. Stigmata, magnified six-fold.
Fig. 7. Section of leaf, magnified six-fold.
Fig. 8. Corm tunic, magnified two-fold; *c*, main tunic; *d*, base of corm.
Fig. 9. Seed, magnified six-fold.

Fig. 1. Feb.y 23rd.

Fig. 2, June 11th

CROCUS DALMATICUS, *Visiani.*

C. reticulatus var. dalmaticus, Herbert.

G. Maw del.

F. Huth, Lith.r Edin.r

Trieste.

35. CROCUS RETICULATUS.

Section: Nudiflori; reticulati *(Herbert)*: Holostigma; vernal *(Baker)*.

Crocus reticulatus, Stev. ex Adam in Weber & Mohr, Beitr. zur Naturk., i, p. 45; M. Bieb, Cent. pl. Ross. tab. i, in part; and Fl. Taur-Cauc. i, 28; Lodd. Cab. 1822; Bouché Gattung Crocus in Linnæa, vol. i, p. 232; Gay in Féruss. Bull. Sc. Nat. xi, p. 270 (370); Rchb. Ic. Crit. x, fig. 939-940; Ic. Fl. Germ., vol. ix, tab. ccclxvi, figs. 790-791; and Fl. Germ. Excurs. 84, 582; Herbert in Bot. Reg. 1841, vol. xxvii, misc. p. 83; 1843, vol. xxix, misc. 30; and 1847, vol. xxxiii, tab. 16 (17), fig. 2; in Bot. Mag. sub-tab. 3865, misc. 11; Link En. Berol. Alb. i, p. 49; Boiss. and Buhse, Cat. Pl. in

Nuov. Mem. Soc. Imp. Nat. Mosc., p. 210; Vis. Fl. Dalmat., vol. i, p. 118; Griseb. Spic. Fl. Rumel et Bithyn. 2, p. 373; Ledeb. Fl. Ross. iv, 109; Baker, Rev. Sp. Crocus in Gard. Chron. 1873, p. 542; List Crocus in Journ. R. Hort. Soc. Lond., new ser., iv, 1877; and Syst. Iridac. in Journ. Linn. Soc., Bot., vol. xvi, p. 82; G. Maw in Gard. Chron. 1877, p. 8; Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, p. 462; in The Garden, vol. xvi, p. 420, Plate cliii, fig. 5; and vol. xxi, No. 532, p. 68; and Hist. Crocus in Journ. Linn. Soc., Bot., vol. xix, p. 373.

C. reticulatus, var. *variegatus*, Trautv. in Bull. Phys.-Math. Acad. St. Petersburg, vol. xvii, p. 329; Lindemann, Fl. Kherson. Herbert, Hist. Crocus, sp. 22, var. 2, p. 33; from Journ. Hort. Soc. Lond., vol. ii, p. 279; and three drawings in Lindl. Libr. R. Hort. Soc. Lond.

C. variegatus, Hoppe and Hornsch, Tagebuch, p. 187, tab. i.; Bert. Desc. Zafferan Ital. No. 6; and in Nuov. Collez. p. 149; Gay in Féruss. Bull. Sc. Nat. xi, p. 350; and drawing Bibl. J. D. Hooker; Sturm, Deutsch. Fl. xiii, tab. 54; W. Koch Syn. Fl. Germ. et Helv. ed. 2, p. 805; Parlat. Fl. Ital., vol. iii, p. 227; Klatt, Revis. Irid. in Linnæa xxxiv, p. 679 and 720; Boiss. Fl. Orient. vol. v, part i, p. 102.

Var. *micranthus*, G. Maw, Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, p. 462.

C. micranthus, Boiss., Diag. Ser. 2, iv, p. 95; Tchihatcheff, Asie Min. part iii, vol. ii, p. 523.

C. variegatus, var. β, *micranthus*, Boiss. Fl. Orient. vol. v, p. 102.

C. reticulatus, Baker, Rev. Sp. Crocus in Gard. Chron. 1872, p. 542; List Crocus in Journ. R. Hort. Soc. Lond., new ser., iv, 1877; and Syst. Iridac. in Journ. Linn. Soc., Bot., vol. xvi, p. 82.

Cormus circiter ½ poll. (0.013 metr.) latus et altus. Tunica fibris validulis rigidis reticulatis confecta in fasciculo cuspidum fibrosorum acutorum producta. Tunica basalis discus validus cartilagineus, cuspidibus radiantibus cinctus. Folia fauce ad florationem æquantia, $\frac{1}{16}$ poll. (0.0016 metr.) lata, matura 8—10 poll. (0.200—0.250 metr.) longa, costis 1—2 in canaliculis lateralibus. Vaginæ quam spatha breviores. Spatha diphylla. Perianthium: faux glabra; segmenta 1½ poll. (0.038 metr.) longa, ⅓ poll. (0.0084 metr.) lata, acuta, alba vel splendide lilacina; segmenta exteriora extus striis penniformibus purpureis ornata. Antheræ aurantiacæ, filamentis aurantiacis bis æquantes. Stylus ad medias antheras fissus; stigmata subintegra coccinea, antheras superantia. Semina pallide ochrea.

Corm about half an inch (0.013 metre) broad and high. *Tunic* of strong, wiry, reticulated fibre, produced upwards into strong, pointed fibres. *Basal Tunic* a coriaceous disc, surrounded by radiating fibres.

Sheathing Leaves about four, from half an inch (0.013 metre) to two inches (0.050 metre) in length, falling short of the proper spathe.

Proper Leaves three or four, appearing with the flowers, reaching to the throat at the flowering-time, and produced to a length of about nine inches (0.225 metre) at maturity, one-sixteenth of an inch (0.0016 metre) broad, glabrous; the *keel* convex, one half the width of the blade, the lateral channels containing two prominent ridges.

Proper Spathe diphyllous, about an inch and a half (0.038 metre) in length, exceeding the sheathing leaves.

Perianth: Tube two and a half inches (0.063 metre) in length from the ovary to the throat. *Throat* glabrous, white or yellow. *Segments* acute, reflexed, an inch and a half (0.038 metre) long, and one-third of an inch (0.0084 metre) broad, varying from white to lilac; the outer surface of the outer segments feathered with purple.

Stamens fully half an inch (0.013 metre) in height, shorter than the pistil; the orange *Anthers* twice the length of the yellow *Filament*. The *Pollen Grains* $\frac{1}{330}$ of an inch (0.00008 metre) in diameter, glabrous, orange.

CROCUS RETICULATUS, *M. Bieb.*

C. variegatus, Hoppe & Hornsch.

J. Maw del. F. Huth Lith.r Fecit

Pistil about three-quarters of an inch (0.019 metre) in height from the throat, somewhat taller than the stamens; the *Style* dividing at the level of the middle of the anthers, and produced into sub-entire scarlet stigmata.

Scape about an inch (0.025 metre) high at the flowering-time, produced to a height of an inch and a half (0.038 metre) at the maturity of the capsule.

Capsule about five-eighths of an inch (0.016 metre) high, and one-third of an inch (0.0084 metre) broad.

Seed oval, three-twentieths of an inch (0.0038 metre) high, and one-tenth of an inch (0.0025 metre) broad, buff, glabrous; the raphe, chalaza, and caruncle of a paler colour than the body of the seed.

Crocus reticulatus has a wide range in longitude; occurring as far west as Monfalcone, near Trieste, longitude 13° 30′ east, and as far east as the northern slopes of the Caucasus, longitude 42° 30′ east. In latitude it ranges from Bulgaria, 43° north, to about 50½° north, in Southern Russia.

Parlatore refers to its supposed occurrence near Parma, about 3° west of its general area. Cosson's Herbarium contains a specimen labelled "*Siberia*," obviously an error, being probably intended for Servia. *Crocus micranthus*, Boissier, which I take to be a small variety of *C. reticulatus*, occurs in Cilicia, 8° south of the southern limit of the area in which the type form occurs. The type ranges through 29 degrees of longitude, and 7½ degrees of latitude, and has been found at altitudes of from one thousand to fourteen hundred feet at Monfalcone, the Lippizza Forest, Monte Spaccato, Opschina, and other places on the Carso, a limestone plateau above Trieste; also in Istria, at Pola, Friule, and near Fiume. It has also been recorded from the neighbouring island of Veglia, and from The Herzegovina.

In Hungary and the Banat it occurs at Tenzelitze, near Buda-Pest, at Versitz (Versecz), at Csiklova and Mount Simeon (Szimion). In oak woods near Monte Varaschin (April 27th), Magnum Varadinum, Limestone Hills Majdan, Aparti, County of Behar, and Carlsdorf (Karlsdorf).

In Northern Servia, near Topeider and Rahovica, and in Wallachia near Bucharest.

It occurs also in Bulgaria, Moldavia, Macedonia, and the Dobrudscha. Throughout Southern Russia, as far north as latitude 50°, it is abundant and widely distributed, especially in the Ukraine, Podolia and the provinces Kiev, Kherson and Poltova, as at Yampol (Jampol) on the river Dniester, Nestouta near Balta, Kanjew, and between Belvia, Zerkov and Kiev; near Uman, at Olivopol on the river Bug, near Odessa; at Elizabethgrad, one hundred and eighty miles north by west of Kherson; near Lubuy, Poltova, near Khoral (Khorol, Choral) in the province of Poltova; at Serikow (Serikoiè), at Ekaterinoslav on the Dnieper, at Kharkow (Kharkov, Charkow) in the Ukraine, and in the neighbourhood of the lower part of the Don.

It has been found at Simpheropol and in the eastern part of the Crimea, and abundantly on the Steppes near Ekaterinograd; at Piati-gorsk and Georgiewsk (Georgievsk) in the province of Terek on the north slopes of the Caucasus.

Crocus reticulatus flowers in the early spring from the end of February to the beginning of April. I collected it in the neighbourhood of Trieste at the end of February, 1876, and still have it in cultivation. It can scarcely be recommended as a decorative plant; as, although it occasionally flowers, and the flowers are very ornamental, it seems to want the vigour of many vernal species, and is not nearly so robust and floriferous as the nearly allied *C. dalmaticus*.

Herbert associated as varieties of *C. reticulatus* the four following species; viz. *susianus*, Ker, as his var. 1, *auritextus; reticulatus*, M. Bieb, as his var. 2, *variegatus; dalmaticus*, Visiani, as var. 3, *dalmaticus;* and *C. ancyrensis;* but all recent writers recognise their separate specific rank.

REFERENCES TO PLATE XXXV.

Fig. 1. Flowering-state, March 12th, actual size.
Fig. 2. With matured leaves and capsule, June 9th, actual size.
Fig. 3. Diagrammatic dissection of scape, ovary, and spathes, actual size.
Fig. 4. Stamens and Pistil, magnified two-fold.
Fig. 5. Pollen Grain, magnified one hundred and fifty-fold.
Fig. 6. Stigmata, magnified six-fold.
Fig. 7. Section of leaf, magnified six-fold.
Fig. 8. Seed, magnified six-fold.
Fig. 9. Corm tunics, magnified two-fold: *a*, main tunic; *b*, basal tunic.

REFERENCES TO PLATE XXXV*b*.—Var. *micranthus*.

Fig. 1. Flowering-state, vernal, actual size.
Fig. 2. Diagrammatic dissection of scape, ovary, and spathes, actual size.
Fig. 3. Stamens and Pistil, magnified two-fold.
Fig. 4. Stigmata, magnified six-fold.
Fig. 5. Section of leaf, magnified six-fold.
Fig. 6. Corm tunic, magnified two-fold.

Fig. 3 & 3a.

CROCUS RETICULATUS, *M. Bieb., var.* MICRANTHUS.

C. micranthus, Boiss., C. variegatus var. β. micranthus, Boiss.

Aucher-Eloy Herb. Orient. No. 2127.

36. CROCUS SUSIANUS.

Section: Nudiflori; reticulati *(Herbert)*: Holostigma; vernal *(Baker)*.

Crocus susianus, (not *C. susianus*, Tchihatcheff, Asie Min.) Ker in Bot. Mag. 1803, tab. 652; and Irid. Gen. p. 78; Red., Lil., vol. v, tab. 293; Hayne, Arzneigewächse, vi, tab. 28; Sabine in Trans. Hort. Soc. Lond., vol. vii, p. 424; Gay, three drawings Bibl. J. D. Hooker; Nees Gen. Pl., 3, x; Rchb., Ic. Crit. tab. 928, fig. 1249; and Ic. Fl. Germ. vol. ix, p. 9, tab. cccIviii, fig. 794; Loud. Bulb. Plants. tab. 23, fig. 5; Klatt, Revis. Irid. in Linnæa xxxiv, p. 678, and 719; Baker, Rev. Sp. Crocus in Gard. Chron. 1873, p. 291; List Crocus in Journ. R. Hort. Soc., new ser., 1877; and Syst. Iridac. in Journ. Linn. Soc., Bot., vol. xvi, p. 80; G. Maw, Synops. Genus Crocus, in Gard. Chron., new ser., vol. xvi, p. 528; in The Garden, vol. xxi, num. 532, p. 68; and Hist. Crocus in Journ. Linn. Soc., Bot., vol. xix, p. 373; Boiss., Fl. Orient. vol. v, part 1, p. 103.

C. revolutus, Haworth in Trans. Hort. Soc. Lond., vol. 1, p. 136.

C. reticulatus, Var. a., in part, M. Bieb., Cent. Pl. Ross., tab. 1.

C. reticulatus, Vars. *reflexus*, and *rectilimbus*, Herbert in Bot. Mag. 1841, sub. tabs. 3865 and 3866.

C. reticulatus, var. 1, *auritextus*, and sub-vars. *reflexus*, and *rectilimbus*, Herbert, Hist. Sp. Crocus, sp. 32, p. 33; from Journ. Hort. Soc. Lond., vol. ii, p. 279; and drawing of var. *reflexus* in Lindl. Libr. R. Hort. Soc. Lond.

C. reticulatus, var. *aureus*, (not *C. aureus*, Sibth. and Smith), Traut. in Bull. Phys-Mathem. Acad. St. Petersburg, vol. xvii, p. 329; Lindermann Fl. Kherson.

C. Rœgnerianus, K. Koch in Linnæa, vol. xxi, p. 634.

Var. *fulvus*. *C. fulvus*, Pallas Herb.

C. reticulatus, sub-var. 3, *immaculatus*, Herbert, Hist. Sp. Crocus sp. 32, p. 33; from Journ. Hort. Soc. Lond., vol. ii, p. 279; and in Bot. Mag. 1841, sub. tabs. 3865 and 3866.

C. susianus, var. 1 *immaculatus;* Baker, List Crocus in Journ. R. Hort. Soc. Lond., new ser., vol. iv, 1877; and Syst. Iridac. in Journ. Linn. Soc., Bot., vol. xvi, p. 80.

Cormus circiter $\frac{3}{4}$ poll. (0.019 metr.) latus et altus. Tunicæ fibri validi reticulati, reticulationibus magnis, apices acuti rigidi producti. Tunica basalis, discus cartilagineus validus, cuspidibus rigidis radiantibus cinctus. Vaginæ quam spatha breviores. Folia floribus æquantia, $\frac{1}{16}$ poll. (0.0016 metr.) lata, carinæ et laminæ marginibus ciliatis. Spatha diphylla. Perianthium: faux glabra; segmenta circiter $1\frac{1}{2}$ poll. (0.038 metr.) longa, $\frac{1}{2}$ poll. (0.013 metr.) lata, reflexa, aurantiaca, segmenta exteriora extus varie striis penniformibus brunneis ornata, rarius concolora aurantiaca, vel undique brunnea suffusa. Antheræ aurantiacæ, filamentis aurantiacis bis æquantes. Stylus ad basin antherarum fissus; stigmata longa integra aurantiaco-coccinea, antheras multo superantia. Semina rubra, matura brunnea.

Corm about three-quarters of an inch (0.019 metre) broad and high, much larger in the cultivated plant. *Tunic* of strong reticulated fibre, with long interspaces, produced upwards into sharp wiry points; *Basal Tunic* a strong coriaceous disc surrounded by radiating wiry fibres.

Sheathing Leaves about four, falling short of the proper spathe, from half an inch to two and a half inches (0.013—0.063 metre) in length.

Proper Leaves about six, reaching to the level of the flowers at the flowering-time, and produced to a length of about ten inches (0.250 metre) at maturity, one-sixteenth of an inch (0.0016 metre) broad; the margins of the blade and keel ciliated; the keel convex, about half the width of the blade.

Proper Spathe diphyllous, from two to three inches (0.050—0.075 metre) in length, exceeding the sheathing leaves and reaching nearly to the throat.

Perianth: Tube from two and a half to three inches (0.063—0.075 metre) in length from the ovary to the throat, orange, veined with bronze. *Throat* unbearded, orange. *Segments* about an inch and a half (0.038 metre) long, and half an inch (0.013 metre) broad, reflexed, deep orange; the outer surface of outer segments variously feathered with deep brown, occasionally self-coloured orange, or evenly suffused with dull brown.

Stamens shorter than the pistil, about half an inch (0.013 metre) in height; the orange *Anthers* one-third of an inch (0.0084 metre) in length, and twice the length of the yellow *Filament*. *Pollen Grain* glabrous, orange, $\frac{1}{430}$ of an inch (0.00006 metre) in diameter.

Pistil three-quarters of an inch (0.019 metre) in height from the throat, exceeding the stamens; the *Style* dividing at the level of the base of the anthers, and produced into long, spreading, entire, orange-scarlet *Stigmata*.

Scape fully an inch (0.025 metre) in height at the flowering-time, produced to a height of two and a half inches (0.063 metre) at the maturity of the capsule; the *Ovary* striped with purple.

Capsule two-thirds of an inch in height (0.017 metre), and one-third of an inch (0.0084 metre) broad.

Seed red, ripening to brown, slightly papillose, one-seventh of an inch (0.0063 metre) in height, and one-tenth of an inch (0.0025 metre) broad; the raphe, chalaza, and caruncle of the same colour as the body of the seed.

Crocus susianus has a much less extended range than the nearly allied species *C. reticulatus*, being confined to a limited district in south-west Russia and the Crimea between $44\frac{1}{2}$ and 49 degrees north latitude, and $28\frac{1}{2}$ and 34 degrees east longitude. It has been recorded from near Yampol (Jampol), on the river Dniester, and Nestouta, near Balta, in South Podolia; near Uman in the Province of Kiev; Olivopol on the river Bug, and Odessa in the Province of Kherson; in the neighbourhood of the river Dnieper in the Provinces of Kherson and Taurida; and from Sebastopol and Inkerman, in the Crimea.

Herbert placed it as a variety only of *C. reticulatus;* but few botanists would now associate the two species. Besides the difference in colour, *C. susianus* is readily distinguished from *C. reticulatus* by its much longer pistil, the style dividing near the throat; by its red seed, and ciliated leaves: the perianth segments are reflexed. It is a species very variable in its markings; in some forms the outer surface of the outer segments are of a uniform deep bronze colour, passing through a variety of bronzed striping and feathering, to an external suffusion of dull brown (*C. fulvus* of Pallas).

Tchihatcheff confounds *C. susianus* with *C. gargaricus*, and erroneously records

Fig. 1, Feby 26th

Fig. 5. June 14th

CROCUS SUSIANUS, *Kir.*

C. revolutus, Haworth. C. reticulatus var. α. M. Bieb.
C. reticulatus var. auritextus, Herbert. C. Rœgnerianus, K. Koch.

S Maw del

F Huth, Lith.r Ehrf

its occurrence in Bithynia and about Constantinople; it has also been recorded from the Caucasus.

It is nearly allied to *C. ancyrensis;* but the latter species is invariably self-coloured orange; the segments are never reflexed as in *C. susianus*, a character which suggested the name of *revolutus* to Haworth; and the two species occupy distant and distinct geographical districts.

C. susianus is one of the earliest vernal species, the flowers expanding in February. It has long been familiar to cultivators under the name of *The Cloth of Gold* Crocus, and was one of the first of the few species introduced at an early period to Dutch and English gardens.

In Gerard's Herbal, published in 1597, figs. 10 and 11 appear to represent this species. In the first edition (1611) of J. Th. de Bry's *Florilegium Novum.*, as well as the edition of 1641, the plate of Crocuses includes two orange species, one of which appears to be *C. susianus*. Plate V, of Emanuel Sweert's *Florilegium*, published in 1612, also includes it; and many succeeding writers refer to it. Thus we may conclude that it has been in cultivation nearly three hundred years, although there is no record of the date of its original introduction.

REFERENCES TO PLATE XXXVI.

Fig. 1. Flowering-state, February 26th, actual size.
Fig. 2. Outer surface of inner segment, actual size.
Fig. 3. Outer surface of outer segment, actual size.
Fig. 4. Inner surface of segment, actual size.
Fig. 5. With matured leaves and capsule, actual size.
Fig. 6. Diagrammatic dissection of scape, ovary, and spathes, actual size.
Fig. 7. Stamens and Pistil, magnified two-fold.
Fig. 8. Pollen Grain, magnified one hundred and fifty-fold.
Fig. 9. Stigmata, magnified six-fold.
Fig. 10. Seed, magnified six-fold.
Fig. 11. Section of leaf, magnified twelve-fold.
Fig. 12. Corm tunics, magnified two-fold: *a*, main tunic; *b*, basal tunic.

37. CROCUS STELLARIS.

Section: Nudiflori; parallelo-fibrosi (reticulati?) *(Herbert)*: Holostigma; vernal *(Baker)*.

Crocus stellaris, Haworth, Trans. Hort. Soc. Lond., vol. i, p. 136 and tab. vi; Salisb., drawing in Bibl. Bot., Brit. Museum; Sabine in Trans. Hort. Soc. Lond., vii, p. 422; Gay, three drawings Bibl. J. D. Hooker; G. Maw, Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, p. 528; in The Garden, vol. xxi, num. 532, p. 68; and Hist. Crocus in Journ. Linn. Soc., Bot., vol. xix, p. 373.

C. lagenæflorus, var. 3, *stellaris*, Herbert, Hist. Crocus, sp. 34, p. 36; from Journ. Hort. Soc. Lond., vol. ii, p. 282; and drawing in Lindl. Libr. R. Hort. Soc. Lond.

C. susianus, in part, Klatt Revis. Irid. in Linnæa, vol. xxxiv, p.p. 678 and 719.

C. mœsiacus, var. 2, *stellaris*, Baker, Rev. Sp. Crocus in Gard. Chron. 1873, p. 291; List Crocus in Journ. R. Hort. Soc. Lond., new ser., vol. iv; and Syst. Iridac. in Journ. Linn. Soc., Bot., vol. xvi, p. 80.

Cormus circiter $\frac{3}{4}$ poll. (0.019 metr.) latus et altus. Tunicæ fibri validuli paralleli cartilaginei, sursum reticulati, in cuspides validos ad apicem cormi producti. Tunica basalis, discus cartilagineus radiis latis planis acutis cinctus. Vaginæ quam spatha breviores. Folia, 4, floribus æquantes, $\frac{1}{10}$ poll. (0.0025 metr.) lata, glabra. Spatha diphylla, fauce ferme æquans. Perianthium: insigniter aurantiacum, faux haud barbata; segmenta circiter $1\frac{1}{2}$ poll. (0.038 metr.) longa, acuta, exteriora extus 3—5 striis purpureis ornata. Antheræ pallide aurantiacæ, acuminatæ, divergentes, filamentis aurantiacis paullo longiores, (steriles, pollinis granulæ parvæ, irregulares, ferme abortivæ). Stylus ad apices antherarum fissus; stigmata integra pallide aurantiaca quam antheras longiora. Semina nunquam maturant.

Corm from half an inch (0.013 metre) to three-quarters of an inch (0.019 metre) broad and high. *Tunic* coriaceous, reticulated upwards; the *Cap* reticulated and produced upwards into strong pointed fibres. The *Basal Tunic*, a coriaceous disc, surrounded by flat, pointed, fibrous rays.

Sheathing Leaves about four, shorter than the proper spathes, from half an inch (0.013 metre) to two and a half inches (0.063 metre) in length.

Proper Leaves about four, reaching to the level of the flowers, and produced at maturity to a length of nine or ten inches (0.225—0.250 metre), one-tenth of an inch (0.0025 metre) broad, glabrous; the keel convex, one-third the width of the blade.

Proper Spathe diphyllous, the outer spathe tubular, the inner, ligulate, about two inches (0.050 metre) in length, and reaching nearly to the throat.

Perianth: *Tube* from two, to two and a half inches (0.050—0.063 metre) in length from the ovary to the throat. *Throat* unbearded. *Segments* about an inch and a half (0.038 metre) long, and a third of an inch (0.0084 metre) broad, bright orange; the outer surface of the outer segments feathered with from three to five bronze-coloured lines.

Stamens about three-eighths of an inch (0.010 metre) high; the pale orange *Anthers* tapering upwards, about a quarter of an inch (0.0063 metre) in length, and twice the length of the pale orange *Filament.* *Pollen Grains* orange, of irregular size and form, effete.

Pistil fully half an inch in height from the throat, higher than the stamens; the *Style* dividing at the level of the summit of the anthers, and produced into pale orange, entire stigmata.

Scape about an inch (0.025 metre) high at the flowering-time.

Capsule abortive, and never matures seed.

Crocus stellaris closely resembles some of the old horticultural forms of *Crocus aureus*, but differs from them in having a reticulated coriaceous corm tunic. It has been long in cultivation, but its origin and history are unrecorded. It has never been found in a wild habitat, and is probably a garden variety. It never produces seed, and its stamens and pollen grains are unnaturally reduced in size and are effete. Baker suggests that it may be an old garden hybrid between *aureus* and *susianus*, as it combines the characters of both of these species; but against this assumption, we must bear in mind that there is no authenticated record of a hybrid Crocus having ever been produced, or found in a wild state. *C. stellaris* flowers early in March.

REFERENCES TO PLATE XXXVII.

Fig. 1. Flowering-state, March 18th, actual size.
Fig. 2. With matured leaves, May, actual size.
Fig. 3. Diagrammatic dissection of scape, ovary, and spathes, actual size.
Fig. 4. Stamens and Pistil, magnified two-fold.
Fig. 5. Pollen Grains, magnified one hundred and fifty-fold.
Fig. 6. Stigmata, magnified six-fold.
Fig. 7. Section of leaf, magnified two-fold: *a*, cap; *b*, main tunic; *c*, basal tunic.

CROCUS STELLARIS, *Sabine.*

J. Maw del. F. Huth, Lith. Edin.

Angora, Asia Minor.
From a drawing by C. G. Danford, Esq

38. CROCUS ANCYRENSIS.

Section: Nudiflori; reticulati *(Herbert)*: Holostigma; vernal *(Baker)*.

Crocus ancyrensis, G. Maw, Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, p. 528; in The Garden, vol. xxi, no. 532, p. 68; and Hist. Crocus in Journ. Linn. Soc., Bot., vol. xix, p. 373; Boiss., Fl. Orient. vol. v, part 1, p. 104.

C. reticulatus, var. 5, *ancyrensis*, Herbert, Hist. Crocus, p. 33, sp. 32, var. 5; from Journ. Hort. Soc., vol. ii, p. 279.

C. susianus, var. 2, *ancyrensis*, Baker, List Crocus in Journ. R. Hort. Soc. Lond., new ser., vol. iv, 1877; and Syst. Iridac. in Journ. Linn. Soc., Bot., vol. xvi, p. 80.

? C. susianus, var. *immaculatus*, Baker, Rev. Sp. Crocus in Gard. Chron., 1873, p. 291 (referring to a specimen in the Kew Herbarium gathered by Lady Liston near Constantinople).

Cormus pyriformis, $\frac{3}{4}$ poll. (0.019 metr.) latus, ferme 1 poll. (0.025 metr.) altus. Tunicæ fibri validi reticulati, superne et inferne cuspidibus validulis rigidis terminati. Tunica basalis radiis validis rigidis e disco cartilagineo radiatis confecta. Vaginæ quam spatha breviores. Folia glabra, tria, fauce æquantia, costis duabus in canaliculis lateralibus. Spatha diphylla. Perianthium: tubus purpureus; faux glabra, extus sæpe purpurascens; segmenta obtusa ovato-lanceolata, $\frac{3}{4}$—1 poll. (0.019—0.025 metr.) longa, $\frac{1}{3}$ poll. (0.084 metr.) lata, aurantiaca haud striata. Antheræ aurantiacæ acuminatæ, divergentes, ferme sessiles, quam filamenta brevissima aurantiaca quater longiores. Stylus fissus ad medias antheras; stigmata coccinea integra, antheris æqualia.

Corm pyriform, about three-quarters of an inch (0.019 metre) broad, and an inch (0.025 metre) high. *Tunic* of strong reticulated fibre, produced above and below into strong wiry points; the *Cap* reticulated, produced upwards into strong, pointed fibres. *Basal Tunic* of strong, wiry, branching fibres, radiating from a coriaceous disc.

Sheathing Leaves about four, from half an inch to three inches (0.013—0.075 metre) long, falling short of the proper spathe.

Proper Leaves from three to four, reaching to the level of the flowers at the flowering-time, and produced at maturity to a length of about twelve inches (0.300 metre), glabrous, about one-tenth of an inch (0.0025 metre) broad; the keel one-third the width of the blade, margins of blade revolute, the lateral channels containing two prominent ridges.

Proper Spathe diphyllous, about two inches (0.050 metre) in length, reaching to within an inch (0.025 metre) of the throat.

Perianth: Tube about three inches (0.075 metre) in length from the ovary to the throat, orange or purple in colour. *Throat* unbearded. *Segments* ovato-lanceolate, three-quarters of an inch, to an inch (0.019—0.025 metre) long, and a third of an inch (0.0084 metre) broad; rich orange without markings.

Stamens rather more than half an inch (0.013 metre) high. *Anthers* divergent, tapering upwards, orange, about four times the length of the short, orange *Filament*. *Pollen Grain* $\frac{1}{400}$ of an inch (0.00006 metre) in diameter; orange, the surface sculptured with sinuous channels.

Pistil slightly exceeding the stamens, from half an inch (0.013 metre) to three-quarters of an inch (0.019 metre) high from the throat; the *Style* dividing at the level of the middle of the anthers, and produced into entire, orange-scarlet stigmata.

Scape at the flowering-time about an inch and a half (0.038 metre) high.

Capsule and *Seed* unknown.

Crocus ancyrensis was known to Dean Herbert, who had it in cultivation at Spofforth from corms obtained at Angora; but in placing it, as well as the Crimean *C. susianus*, as varieties of *C. reticulatus*, he failed to recognise its specific rank.

Fig 1, Feb 7th

CROCUS ANCYRENSIS.

C. reticulatus, var. ancyrensis Herbert. *C. susianus, var. ancyrensis, Baker.*

J. Maw del.

F. Huth, Lith.ª Edin.ª

Few botanists would now associate it with *C. reticulatus*, and although it approaches *C. susianus* nearer than any other Crocus, it cannot be placed with that species. The following characters readily distinguish it:—the blunt obovate segments are invariably self-coloured; the stigmata, which in *C. susianus* diverge near the level of the throat, in *C. ancyrensis* separate much higher up; and the leaves, which are ciliated in *C. susianus*, are glabrous in this species. *C. ancyrensis* appears to be abundant throughout a large district in central Asia Minor. I am indebted to the late Mr. Gavan Gatheral, H.B.M. Vice-Consul at Angora, for a liberal supply of the corms. The Rev. A. W. Hubbard, of the American Mission at Sivas, has on several occasions sent me roots from that district, where he tells me the corms are collected for food. Mrs. Danford collected it on the Ackyr Dagh, near Marash, on February 28th, 1879, and again in March, 1879, on Mount Argæus, near Kaisarieh. There are also specimens in the Herbarium at the Jardin des Plantes, Paris, collected by Monsieur P. E. Botta in Asia Minor, *près de la neige*, but no locality is given.

It ranges in latitude from 37° 30′ to 40° north, and in longitude from 32° 45′ to 37° east; probably even beyond these limits. I am not certain whether it extends into Western Bithynia; not having observed it in any of the localities I have visited in that district. Baker refers to a specimen in the Kew collection, gathered by Lady Liston near Constantinople, which may be this species.

It flowers freely with me at Benthall but I have not yet succeeded in obtaining seed. It is an attractive species, but is seen to best advantage under the protection of a cold frame.

REFERENCES TO PLATE XXXVIII.

Fig. 1. Flowering-state, February 7th, actual size.
Fig. 2. With matured leaves, April 28th, actual size.
Fig. 3. Diagrammatic dissection of scape, ovary, and spathes, actual size.
Fig. 4. Stamens and Pistil, magnified two-fold.
Fig. 5. Pollen Grain, magnified one hundred and fifty-fold.
Fig. 6. Stigmata, magnified six-fold.
Fig. 7. Sections of leaf, magnified six-fold.
Fig. 8. Corm tunics, magnified two-fold: *a*, cap; *b*, main tunic; *c* and *d*, basal tunics.

39. CROCUS GARGARICUS.

Section: Nudiflori; reticulati *(Herbert)*: Holostigma; vernal *(Baker)*.

Crocus gargaricus, Herbert in Bot. Mag. 1841, sub tab. 3866; in Bot. Reg. 1843, misc. p. 30, 83, 1845, misc. p. 6; and 1847, tab. 16, fig. 1; Hist. Crocus, sp. 33, p. 35; from Journ. Hort. Soc. Lond., vol. ii, p. 281; Klatt, Revis. Irid. in Linnæa, vol. xxxiv, p. 677; Baker, Rev. Sp. Crocus in Gard. Chron. 1873, p. 291; List Crocus in Journ. R. Hort. Soc. Lond., new ser., vol. iv; and Syst. Iridac. in Journ. Linn. Soc., Bot., vol. xvi, p. 80; G. Maw in Trans. and Proceed. Bot. Soc. Edr., 1877, vol. xiii, p. 77; Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, p. 528; in The Garden, vol. xxi, no. 532, p. 68; and Hist. Crocus in Journ. Linn. Soc., Bot., vol. xix, p. 373; Boiss., Fl. Orient., vol. v, part 1, p. 104.

C. aureus, (not *C. aureus*, Sibth. and Smith), Clarke's Travels, vol. ii, p. 146.

C. Thirkeanus, K. Koch in Linnæa, vol. xxi, p. 633; Tchihatcheff, Asie Min., part 3, Bot., vol. ii, p. 523.

Cormus minimus, $\frac{1}{3}$-vix $\frac{1}{2}$ poll. (0.0084—0.013 metr.) latus. Tunicæ fibri tenues dense reticulati; tunicæ basalis fibri tenues radiantes. Vaginæ quam spatha breviores, scapus singulus. Folia erecta glabra, 2-3, fauce æquantia, matura 7 poll. (0.175 metr.) longa, laminæ margines revolutæ, carina angusta, canaliculi laterales ecostati. Spatha monophylla. Perianthium aurantiacum, faux haud barbata; segmenta obtusa, raro emarginata, $1\frac{1}{2}$ poll. (0.038 metr.) longa, vix $\frac{1}{2}$ poll. (0.013 metr.) lata. Antheræ citrinæ, quam filamenta aurantiaca paullo longiores. Stylus ad basin antherarum fissus; stigmata integra aurantiaca, sæpius quam stamina breviora. Capsula globosa; semina aurantiaca.

Corm exceptionally small, about a third of an inch (0.0084 metre) broad, and nearly as high. *Tunic* of finely reticulated fibre; the *Basal Tunic* of fine, unbranched, radiating fibres, covering the lower half of the corm.

Sheathing Leaves three or four, from half an inch (0.013 metre) to two and a half inches (0.063 metre) long, falling short of the proper spathe.

Proper Leaves about three, appearing with the flowers, and reaching to the throat at the flowering-time, produced to a length of seven or eight inches (0.175—0.200 metre) at the maturity of the capsule, one-tenth of an inch (0.0025 metre) broad, glabrous, the keel one-fourth the width of the blade, margins of blade revolute, the lateral channels broad and open.

Proper Spathe monophyllous, about two inches (0.050 metre) in length, exceeding the sheathing leaves.

Perianth: *Tube* nearly three inches (0.075 metre) in length from the ovary to the throat. *Throat* unbearded. *Segments* about an inch and a half (0.038 metre) in length, and barely half an inch (0.013 metre) wide, rich, unstriped orange.

Stamens three-quarters of an inch (0.019 metre) high, exceeding or equalling the pistil; the *Anthers* lemon-coloured, tapering upwards, a little longer than the dark orange *Filament*. *Pollen Grains* $\frac{1}{440}$ of an inch (0.00006 metre) in diameter, glabrous, yellow.

Pistil from half an inch (0.013 metre) to three-quarters of an inch (0.019 metre) high from the throat, falling short of, or equalling the stamens; the *Style* dividing at the level of the middle of the anthers, and produced into nearly entire, orange stigmata.

Scape at the flowering-time about an inch and a half (0.038 metre) high, and produced to a height of from two to three inches (0.050—0.075 metre) at the maturity of the capsule.

Capsule exceptionally short, from three-eighths of an inch (0.010 metre) to half an inch (0.013 metre) high, and from a quarter of an inch (0.0063 metre) to three-eighths of an inch (0.010 metre) broad.

Seed nearly spherical, an eighth of an inch (0.0032 metre) in diameter, *orange*.

Crocus gargaricus is a native of western Bithynia and the Troad, extending from longitude 26° 20′ to 29° 0′ east, and from latitude 39° 20′ to 40° 20′ north. Probably it has a somewhat wider range, though I have met with no records of its occurrence in the centre of Asia Minor. Herbert, on the authority of Dr. Clarke the traveller, records its occurrence on Mount Gargarus in the Troad, where it was also gathered by the late Mr. J. Lander, British Vice-Consul at the Dardanelles; and in June, 1833, by Montbret, near the snow. I gathered it abundantly at the end of April, 1877, on the Bithynian Olympus above Broussa at elevations of from three thousand to four thousand feet. Herbert states that the greater part of Clarke's specimens were of a pale citron-colour, and those received through Mr. Lander, deep golden yellow. Herbert flowered and seeded it at Spofforth. It flowers freely with me at Benthall in the early spring, both in the open air and under the protection of a cold frame. It also produces seed. The form from Mount Olympus is of a deep golden yellow.

Clarke, in his *Travels*, confounds it with *C. aureus*, to which it is not allied. Its orange filament, notably darker than the anthers, the exceptionally short, almost globose capsule and bright orange seed, are distinguishing points.

REFERENCES TO PLATE XXXIX.

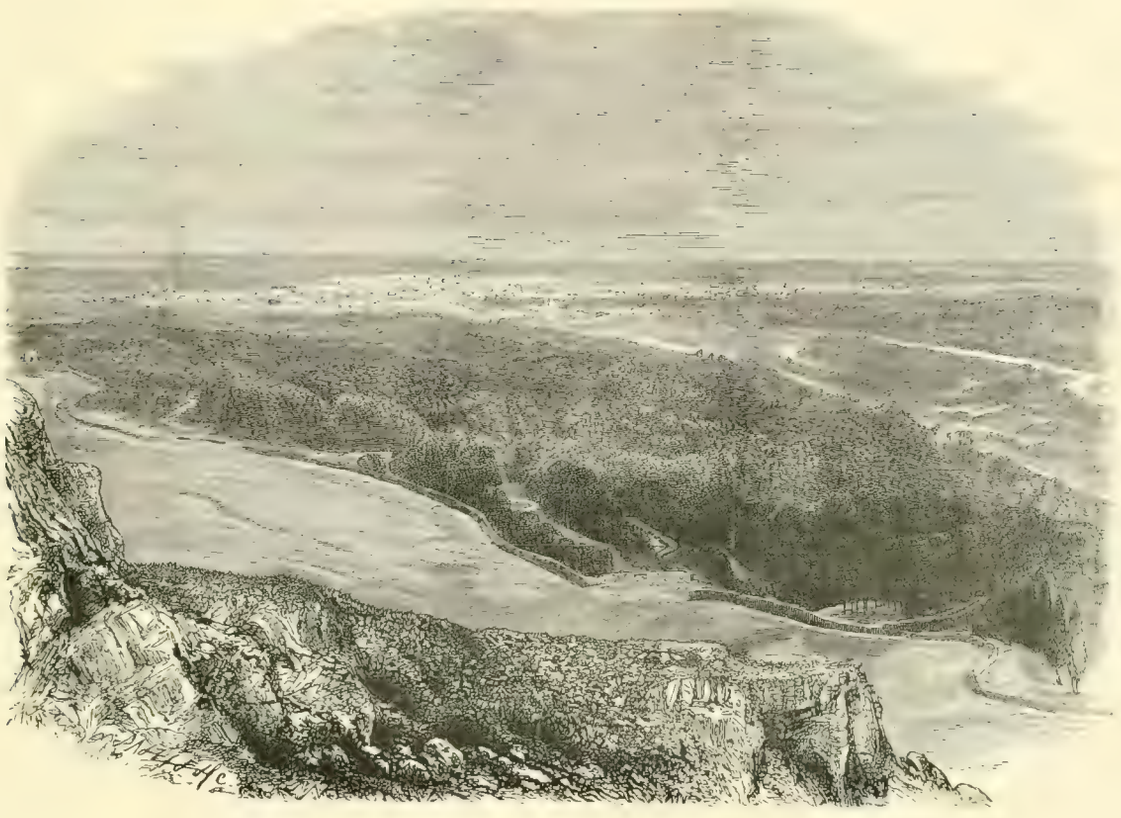
Fig. 1. Flowering-state, March 13th, actual size.
Fig. 2. With matured leaves and capsule, June 23rd, actual size.
Fig. 3. Stigmata, magnified six-fold.
Figs. 4 & 5. Stamens and Pistil, magnified two-fold.
Fig. 6. Pollen Grain, magnified one hundred and fifty-fold.
Fig. 7. Diagrammatic dissection of scape, ovary, and spathes, actual size.
Fig. 8. Seed, magnified six-fold.
Fig. 9. Section of leaf, magnified twelve-fold.
Fig. 10. Corm tunics, magnified two-fold: *a* and *b*, basal tunic; *c*, main tunic.

CROCUS GARGARICUS, *Herbert.*

C. Thirkeanus, K. Koch.

C Maw del

F Bath, Lith^r Edin^r



Damascus, from the north.

40. CROCUS GAILLARDOTII.

Section: Nudiflori; reticulati *(Herbert)*: Schizostigma; vernal *(Baker)*.

Crocus Gaillardotii, G. Maw in Gard. Chron. 1879, p. 234; Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, p. 558; in The Garden, vol. xxi, no. 532, p. 68; and Hist. Crocus in Journ. Linn. Soc., Bot., vol. xix, p. 373; Boiss., Fl. Orient., vol. v, part 1, p. 105.

C. hyemalis var. *Gaillardotii*, Boiss. and Blanche in Boiss. Diagn., ser. 2, iv, p. 93; and Rel. Mail. no. 1718; Baker, Rev. Sp. Crocus in Gard. Chron. 1873, p. 680; List Crocus in Journ. R. Hort. Soc. Lond., new ser., vol. iv, 1877; and Syst. Iridac. in Journ. Linn. Soc., Bot., vol. xvi, p. 84.

C. aleppicus, Baker, Rev. Sp. Crocus in Gard. Chron., new ser., 1873, p. 609; List Crocus in Journ. R. Hort. Soc. Lond., new ser., vol. iv, 1877; and Syst. Iridac. in Journ. Linn. Soc., Bot., vol. xvi, p. 83.

? *C. intromissus*, Herbert, Hist. Crocus, sp. 19, p. 22; from Journ. Hort. Soc. Lond., vol. ii, p. 268.

Cormus $\frac{1}{2}$—$\frac{3}{4}$ poll. (0.013—0.019 metr.) latus et circiter $\frac{3}{4}$ poll. (0.019 metr.) altus; fibri tunicæ tenues reticulati, pileus in processubus ligulatis fibroso-membranaceis, biuncialibus. Vaginæ, quam spatha breviores, scapi 2—3. Folia 5—6, flores superantia, glabra, $\frac{1}{20}$ poll. (0.0013 metr.) lata; canaliculi laterales ecostati. Spatha diphylla, valvulæ 1 poll. (0.025 metr.) longa, fauce æquantes. Perianthium: tubus 1 poll. (0.025 metr.) longa; faux haud barbata (?); segmenta minima circiter $\frac{5}{8}$ poll. (0.016 metr.) longa, $\frac{1}{6}$ poll. (0.0042 metr.) lata, extus pallide lilacina. Antheræ albæ, circiter $\frac{1}{4}$ poll. (0.0063 metr.) longa, quam filamenta flava parum longiores. Stylus ad basin antherarum fissus; stigmata congesta capillacea aurantiaca quam antheræ breviores.

Corm from half an inch to three-quarters of an inch (0.013—0.019 metre) broad and high. *Tunic* of fine reticulated fibres; the *Cap* produced into ligulate fibro-membranous appendages, from an inch and a half (0.038 metre) to two inches (0.050 metre) in height.

Sheathing Leaves about three, from half an inch (0.013 metre) to three inches (0.075 metre) in length, falling short of the proper spathes, including two or three scapes.

Proper Leaves five or six, three or four inches in length (0.075—0.100 metre), somewhat exceeding the flowers at the flowering-time and produced to a length of about a foot (0.300 metre) at maturity, $\frac{1}{12}$ of an inch (0.0021 metre) broad, glabrous; the keel about half the width of the blade, the lateral channels without ridges.

Proper Spathe diphyllous, about an inch (0.025 metre) in length, exceeding the sheathing leaves and reaching nearly to the throat.

Perianth: Tube about an inch (0.025 metre) long from the ovary to the throat. *Throat* unbearded (?). *Segments* very small, about five-eighths of an inch (0.016 metre) long, and one-sixth of an inch (0.0042 metre) broad; white; the outer surface of the outer segments occasionally suffused with purple or lilac.

Stamens exceeding the pistil, barely half an inch (0.013 metre) high; the *Anthers* white, a little longer than the yellow *Filament*.

Pistil from three-eighths to half an inch (0.010—0.013 metre) in height from the throat; the *Style* dividing at the level of the base of the anthers, and produced into pale orange capillary stigmata which scarcely reach the level of the anthers.

Scape at the flowering-time about an inch in height (0.025 metre).

Capsule and *Seed* unknown.

Crocus Gaillardotii was first described from Damascus by Boissier and Blanche, as a variety of *C. hyemalis* (Diag. ser. 2, p. 93); and afterwards as *C. aleppicus* by Baker (*Gard. Chron.* 1873, p. 609) from specimens collected in 1867 by Haussknecht, near Aleppo; Haussknecht's plant, however, is unquestionably identical with that

Fig. 1, Jan.ʸ

Fig. 6 x 12

CROCUS GAILLARDOTII.

C. hyemalis, var. Gaillardotii, Boiss. & Blanche: & Baker. C. aleppicus, Baker. ? C. intromissus, Herbert.

J. Maw del. F. Ruth, Lith.ʳ Edin.ʳ

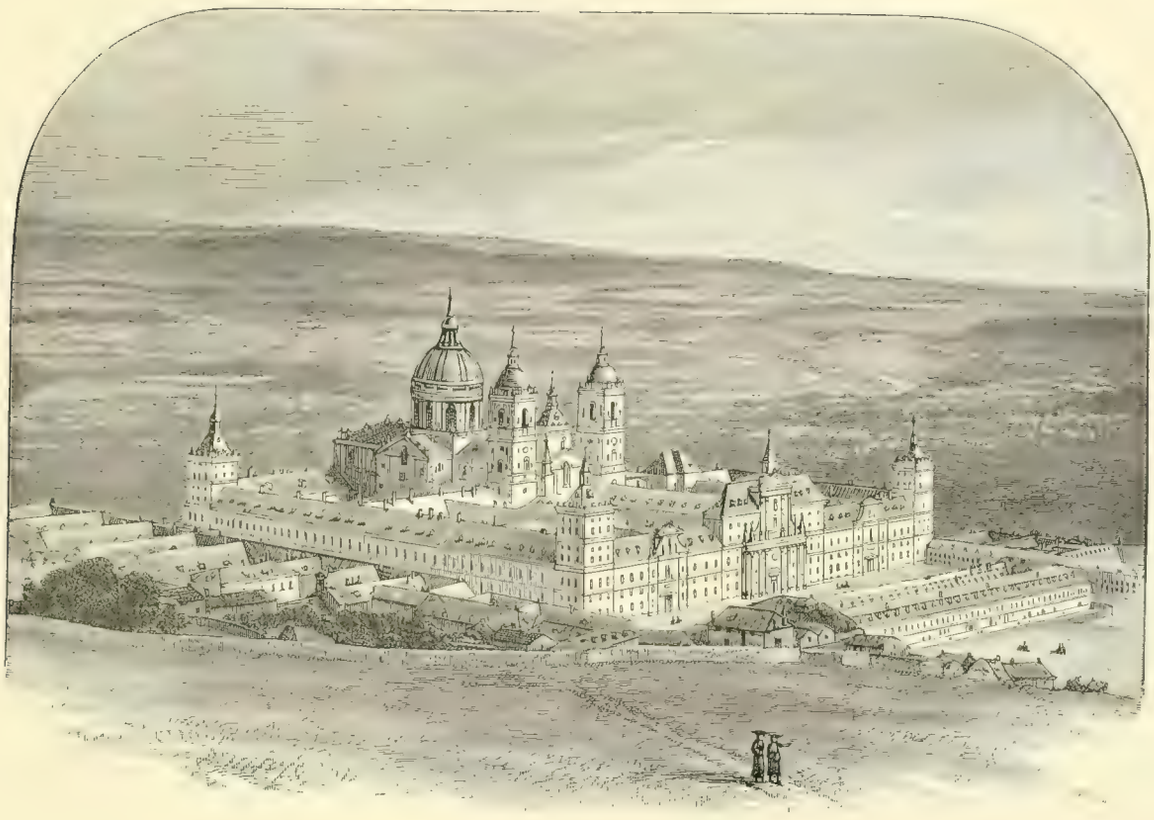
from Damascus. Having had both *C. hycmalis* and *C. Gaillardotii* in cultivation, I think there is no question that the latter is entitled to separate specific rank.

The finely reticulated corm tunic of *C. Gaillardotii* differs notably from that of *C. hycmalis*, which consists of a delicate membrane without intermixture of fibres. The leaves of *C. hycmalis* are more than twice the width of those of *C. Gaillardotii*, and the flowers more than twice the size. The flowers of *C. Gaillardotii* are either externally suffused with lilac, or pure white.

Crocus Gaillardotii is an abundant plant in northern Palestine and Syria, between $33\frac{1}{2}$ and $36\frac{1}{2}$ degrees north latitude, and $35\frac{1}{2}$ and 37 degrees east longitude. It has been recorded from Djebel Nahor (Gebel Nahas), one hour N.W. of Aleppo; Djebjennine and Scanderûn (Iskanderûn) or Alexandretta, Syria; near Sahara, Anti-Libanus; between Damascus and Dimar; on the plateau separating Dimes (Dimâs) from Barrada (Barada); Maarra, Maraba, mountains above Beyrout; above Saida (Sidon), and the Valley of Ouadi el Hariri. Flowering in January. It is so common in the neighbourhood of Damascus that the corms are sold as food in the markets, together with the corms of *C. edulis* (the blue form of *C. cancellatus*), under the name of Hŭrsinein, at a price equivalent to about twopence-halfpenny an imperial pint.

REFERENCES TO PLATE XL.

Fig. 1. Flowering-state, January, actual size.
Fig. 2. With matured leaves, May, actual size.
Fig. 3. Diagrammatic dissection of scape, ovary, and spathes, actual size.
Fig. 4. Stamens and Pistil, magnified two-fold.
Fig. 5. Pistil magnified six-fold.
Fig. 6. Section of leaf, magnified twelve-fold.
Fig. 7. Corm tunics magnified two-fold: *a*, cap; *b*. main tunic; *c*. basal tunic.



El Escorial.
From the slopes of The Sierra Guadarrama.

41. CROCUS CARPETANUS.

Section: Nudiflori; reticulati *(Herbert)*: Holostigma; vernal *(Baker)*.

Crocus carpetanus, Boiss. and Reut., Diag. Plant. Nov. Hisp. p. 24; and Mem. Madrid iv, tab. 4; Herbert, Hist. Crocus, sp. 23, p. 24; from Journ. Hort. Soc. Lond., vol. ii, p. 270; Gay, drawing Bibl. J. D. Hooker; Graells, Indic. Pl. Nov. p. 10; and Ramill. Pl. Espan. fasc. 1, p. 10, Plate 4; Willkomm. and Lange, Prod. Fl. Hisp. vol. i, p. 146; Baker, Rev. Sp. Crocus in Gard. Chron. 1873, p. 542; List Crocus in Journ. R. Hort. Soc., new ser., vol. iv, 1877; and Syst. Iridac. in Journ.

Linn. Soc., Bot., vol. xvi, p. 82; G. Maw in Gard. Chron., Feby. 26, 1876; Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, p. 559; in The Garden, vol. xxi, No. 532, p. 68; and Hist. Crocus in Journ. Linn. Soc., Bot., vol. xix, p. 373.

C. vernus (not *C. vernus* Allione) Brotero, Fl. Lus. p. 49.

? *C. lusitanicus*, Brotero, Fl. Lus.; Herbert in Bot. Reg. 1843, vol. xxix, p. 84.

Cormus $\frac{1}{2}$—$\frac{3}{4}$ poll. (0.013—0.019 metr.) latus et altus. Tunicæ fibri molles reticulati, stuppei, in agmine dense congesta, fenestris quam in ulla specie majoribus, $\frac{1}{8}$—$\frac{3}{16}$ poll. (0.0032—0.0047 metr.) latis, in fasciculo denso fibrorum sericeorum, quam cormus 1—$1\frac{1}{2}$ poll. (0.025—0.038 metr.) longiore producti. Vaginæ quam spatha breviores. Folia floribus æquantia ciliata, semi-cylindrica sine carina vel canaliculi lateralibus, in dorso autem canaliculi, 16 vittis alternis. Spatha diphylla. Perianthium: faux haud barbata alba; segmenta pallide vinoso-lilacina marginibus obscurioribus, vel alba, extus venis cærulescentibus suffusa, 1—$1\frac{1}{4}$ poll. (0.025—0.032 metr.) longa, $\frac{3}{8}$ poll. (0.010 metr.) lata. Antheræ aurantiacæ, filamentis albis bis longiores. Stylus ad bases antherarum fissus. Stigmata pallide lilacina brevia ramis subito reflexis quam antheræ sæpius brevioribus. Semina glabra pallide rufescenti-brunnea, caruncula conspicua.

Corm from half an inch (0.013 metre) to three-quarters of an inch (0.019 metre) broad and high. *Tunic* a dense mass of soft reticulated fibres, resembling tow, in which the intervals of reticulation are much larger than in any other species, often from one-eighth to three-sixteenths of an inch (0.0032—0.0047 metre) across, produced upwards into a bunch of silky fibres, reaching from an inch (0.025 metre) to an inch and a half (0.038 metre) above the summit of the corm.

Sheathing Leaves about four, from half an inch (0.013 metre) to three and a half inches (0.088 metre) in length, falling short of the proper spathe.

Proper Leaves about four, reaching to the level of, or higher than the flowers at the flowering-time, and produced at maturity to a length of about eight inches (0.200 metre), one-tenth of an inch (0.0025 metre) broad, semi-cylindrical, without keel or lateral channels, but furrowed on the back with about sixteen channels, alternating with low ridges; margins of leaf ciliated.

Proper Spathe diphyllous, the outer spathe tubular, the inner ligulate, an inch and three-quarters (0.044 metre) in length, reaching nearly to the throat.

Perianth: Tube about three inches (0.075 metre) long from the ovary to the throat. *Throat* unbearded, white. *Segments* from an inch (0.025 metre) to an inch and a quarter (0.032 metre) in length, and three-eighths of an inch (0.010 metre) in width, varying from delicate vinous-lilac, darker on the margins, to white, and suffused externally towards the base with bluish veins.

Stamens half an inch (0.013 metre) in height, exceeding the pistil, the orange *Anthers* twice the length of the white *Filament*. *Pollen Grain* from $\frac{1}{400}$ to $\frac{1}{350}$ of an inch (0.00006—0.00007 metre) in diameter, yellow, papillose, and channelled externally with a spiral depression.

Pistil shorter than the stamens, three-eighths of an inch (0.010 metre) in height from the throat; the *Style* dividing at the level of the base of the anthers, and shortly produced into pale lilac stigmata, the divisions of which are suddenly reflexed.

Scape two inches (0.050 metre) in height at the flowering-time, and produced to a height of three or four inches (0.075—0.100 metre) at the maturity of the capsule.

Capsule about five-eighths of an inch (0.016 metre) high, and three-eighths of an inch (0.010 metre) broad.

Seed about one-fifth of an inch (0.005 metre) in height, and one-tenth of an inch (0.0025 metre) broad, glabrous, dull rosy-red, ripening to pale reddish brown, glabrous; the prominent caruncle of a paler colour than the body of the seed.

Fig. 1, March 16

Fig. 3, July 7th

CROCUS CARPETANUS, *Boiss. and Reuter.*

J. Maw del.

F. Huth, Lith. Edin.

Crocus carpetanus is limited to the chain of mountains crossing the Spanish peninsula from north-east to south-west, through central Spain and Portugal, ranging from 3° to 8° west longitude, and from 40° to 41½° north latitude, at altitudes of from four thousand to seven thousand feet. It occurs in the Sierra de Guadarrama, in the mountains forming a spur of the range above El Escorial where I gathered it abundantly, in 1879, in company with the late Rev. H. Harpur Crewe at altitudes of from four thousand to five thousand feet; near Marichiva, Peñalara and at the Puerto del Reventon. Mr. C. C. Lacaita found it in the spring of 1882, abundantly in the pine woods on the north side of the Puerto de Nava Cerrada, and on the open ground at and above the Puerto, at an altitude of five thousand eight hundred and thirty-three feet. It has also been recorded from the Sierra de Majareina, and from the alpine region above Gerte near Placencia, flowering as late as June the 16th. In Portugal it occurs on the Serra d' Estrella, and in the neighbourhood of Coimbra.

In cultivation *C. carpetanus* flowers from February to April, but as late as May and June at high altitudes in its native habitats. There are few species in which so many characters, aberrant from those most usually found, are associated. The soft reticulated corm tunic, resembling tow in texture, is found in no other species. The leaf-structure, in which the lateral channel is absent, is also peculiar, likewise the delicate lilac pistil. Its nearest ally is *C. nevadensis*, found in the south Spanish mountains and Algeria, in which the leaf partakes somewhat of the character of *C. carpetanus*, but has a slightly developed lateral channel.

REFERENCES TO PLATE XLI.

Fig. 1. Flowering-state, March 16th, actual size.
Fig. 2. White variety, actual size.
Fig. 3. With matured leaves and capsule, July 7th, actual size.
Fig. 4. Diagrammatic dissection of scape, ovary, and spathes, actual size.
Fig. 5. Stamens and Pistil, magnified two-fold.
Fig. 6. Pollen Grain, magnified one hundred and fifty-fold.
Fig. 7. Stigmata, magnified six-fold.
Fig. 8. Section of leaf, magnified twelve-fold.
Fig. 9. Corm tunic, magnified two-fold.
Fig. 10. Seed, magnified six-fold.

DIVISION II.—NUDIFLORI. Continued.

Species without a basal spathe.

Section II.—FIBRO-MEMBRANACEI.

With a corm tunic of membranous tissue, or of membranous tissue interspersed with nearly parallel fibres.

Spring Flowering, lilac or white.—

42. C. nevadensis.
43. hyemalis.
(44. hermoneus ?)
45. alatavicus.

Autumn Flowering, lilac or white.—

46. caspius.
47. Tournefortii.
47*b*. Boryi.
48. veneris.
49. lævigatus.

Spring Flowering.—

50. vitellinus.
51. Balansæ.
52. Suterianus.
53. Olivieri.
54. candidus.
55. aureus.
56. Korolkowi.
56*b*. Biliottii.

The Sierra Nevada from Granada.

42. CROCUS NEVADENSIS.

Section: Nudiflori; parallelo-fibrosi *(Herbert)*: Odontostigma; autumnal? *(Baker)*.

Crocus nevadensis, Amo and Campo, Revista Progress Cienc. Madrid, vol. v, No. 1, p. 55-57, 1855; and p. 223; Desc. plant. nuov. Reino Granada in Restaur Farmacen xvii, Apend. 1861, p. 8; G. Maw, Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, p. 559; in The Garden, vol. xxi, No. 532, p. 68; and Hist. Crocus in Journ. Linn. Soc., Bot., vol. xix, p. 373.

C. versicolor, (not *C. versicolor*, Gawl,) G. Munby, Cat. Plant. Algeria, ed. 2, 1866, p. 33.

C. atlanticus, Pomel, Nouv. Mater. Fl. Atlant., 1875, p. 383.

C. algeriensis, Baker in Gard. Chron., new ser., vol. vii, 1877, p. 45.

C. carpetanus var., Boiss. and Reut.

C. vernus (not *C. vernus*, Allione) Desf., Fl. Atlant. vol. 1, p. 33.

Cormus pyriformis, $\frac{3}{4}$—$\frac{7}{8}$ poll. (0.019—0.022 metr.) latus, et $\frac{1}{2}$—$\frac{3}{4}$ poll. (0.013—0.019 metr.) altus. Tunicæ fibri paralleli aggregati validuli. Vaginæ quam spatha breviores. Folia floribus æquantia, matura pedalia, $\frac{1}{8}$ poll. (0.0032 metr.) lata, glabra, carina prominula, sex-costata, folia *C. carpetani* simulantia sed canaliculis lateralibus. Spatha diphylla fauce ferme æqualis. Perianthium: faux alba barbata; segmenta 1—$1\frac{1}{2}$ poll. (0.025—0.038 metr.) longa, $\frac{1}{4}$—$\frac{1}{3}$ poll. (0.0063—0.0082 metr.) lata, acuta, sæpius inaperta. Antheræ aurantiacæ, filamento albo bis longiores; stylus ad basin antherarum fissus. Stigmata alba patentia brevia reflexa. Semina obscure ochrea glabra, chalaza, raphe, et caruncula ochroleucis prominulis.

Corm from three-quarters to seven-eighths of an inch (0.019—0.022 metre) broad, and from half an inch (0.013 metre) to three-quarters of an inch (0.019 metre) high. *Tunic* of strong, parallel, closely set fibres.

Sheathing Leaves about four, from three-quarters of an inch (0.019 metre) to four inches (0.100 metre) in length, shorter than the proper spathe.

Proper Leaves four or five, appearing with, and reaching to the level of the flowers; produced to a length of about twelve inches (0.300 metre) at maturity, from one-twelfth to one-tenth of an inch (0.0021—0.0025 metre) broad, glabrous, the keel about half the width of the blade, channelled with six alternating ridges and furrows, the lateral channels narrow, and without ridges.

Proper Spathe diphyllous, the inner spathe ligulate, the outer tubular, exceeding the sheathing leaves and reaching nearly to the throat.

Perianth: *Tube* two and a half to three inches (0.063—0.075 metre) in length from the ovary to the throat. *Throat* pale yellow, bearded. *Segments* from an inch to an inch and a half (0.025—0.038 metre) long, and about one-third of an inch (0.0084 metre) broad, pale lilac or white, the outer surface variously feathered or veined with purple.

Stamens exceeding the pistil, barely three-quarters of an inch (0.019 metre) in height; the yellow *Anthers* longer than the white *Filaments*, which are papillose at the base. *Pollen Grains* slightly papillose, yellow, $\frac{1}{320}$ of an inch (0.00008 metre) in diameter.

Pistil shorter than the stamens, about half an inch (0.013 metre) in height from the throat; the *Style* dividing at the level of the middle of the anthers, and shortly produced into a dense mass of fringed, pearly-white stigmata.

Scape two inches (0.050 metre) high at the flowering-time, lengthening to a height of three inches (0.075 metre) at the maturity of the capsule.

Capsule about three-quarters of an inch (0.019 metre) high, and one-third of an inch (0.0084 metre) broad, veined with purple.

Seed one-quarter of an inch (0.0063 metre) high, and one-ninth of an inch (0.0028 metre) broad, glabrous, buff, the prominent caruncle, raphe and chalaza of a paler colour than the body of the seed.

The history of the various names applied to this species is somewhat peculiar. It is in all probability the plant described by Desfontaine as *C. vernus*, and is without doubt the species included in Munby's Catalogue of Algerian plants as *C. versicolor*, Gawl?. Baker described it in 1877 as a new species, under the name of *algeriensis*, in the *Gardeners' Chronicle;* but it is most widely known as *Crocus atlanticus*, the name given to it by Pomel, in 1875. Looking through Monsieur Boissier's herbarium, I had no hesitation in identifying a Crocus from the Sierra Nevada under the name of *nevadensis* (Amo and Campo) with the Algerian plant; and as it had been so described as long ago as 1855, the name must take precedence of those applied to it by Pomel and by Baker. Through the kindness of Dr. Warion, Medical Major of the 2nd. Spahis, stationed at Side bel Abbès in the province of Oran, who sent me a liberal supply of the corms, I have had it in cultivation since 1877, and have more recently received and cultivated the Sierra Nevada plant, the identity of which is unmistakeable. *C. nevadensis* possesses a special interest, as being the only species, *C. Salzmannii* excepted, common to Europe and Africa.

In Spain it occurs at an altitude of six thousand feet above the wooded region of the Sierra Nevada, between Granada and the village of Gnetor Tajar; also on the Sierra de San Cristoval in the province of Ronda.

In Algeria it is abundant near the Marocco frontier in the south-western parts of the province of Oran in clearings in the forests of *Pinus halepensis*, on The Tell and Hautes Plauteax, at altitudes of from one thousand five hundred to three thousand or three thousand five hundred feet.

Dr. Warion informs me that it has been found at Daya, Magenta, Ras-el-ma, Titenyaya, El Gor, Sebdou, Beticha, El Aricha, Ras el Assfour, and Gharrouban.

Including both the Spanish and Algerian localities, the range of the species would be between 34° and 37° north latitude and 0° 30′ and 5° 30′ west longitude.

It is one of the earliest vernal species, flowering in Algeria from the middle of January to the end of February; and under cultivation with the protection of a cold frame, the flowers are produced early in January.

The flowers rarely expand, and then are only partially open, the segments bending over for about half their height. *C. nevadensis* is more nearly allied to *C. carpetanus* than to any other species, particularly in the characters of the stigmata and leaves.

REFERENCES TO PLATE XLII.

Figs. 1 & 4. Flowering-state, January 28th, actual size; cultivated specimens from the Sierra Nevada.
Figs. 2 & 5. Flowering-state, March 17th, actual size; cultivated specimens from Algeria.
Fig. 3. Outer surface of outer segments, actual size; Sierra Nevada.
Fig. 6. With matured leaves and capsule, July 11th, actual size; cultivated specimen from Algeria.

Fig. 7. Nearly matured capsule, May 18th, actual size; cultivated specimen from Algeria.
Fig. 8. Seed, magnified six-fold.
Fig. 9. Diagrammatic dissection of scape, ovary, and spathes, actual size.
Fig. 10. Corm tunics, magnified two-fold: *a*, cap; *b*, main tunic.
Fig. 12. Stamens and Pistil, magnified two-fold.
Fig. 13. Pollen Grain, magnified one hundred and fifty-fold.
Fig. 14. Stigmata, magnified six-fold.
Fig. 15. Section of leaf, magnified twelve-fold.

Fig. 15 ×12.

Fig. 2, March 17th

Fig. 9

Fig. 7, May 18th

Fig. 8 ×6.

Fig 6, July 11th

CROCUS NEVADENSIS, *Amo and Campo.*

C. atlanticus, Pomel. *C. algeriensis, Baker.*

F. Huth, Lith^r Edin^r

Bethlehem.

43. CROCUS HYEMALIS.

Section: Nudiflori; membranacei *(Herbert)*: Schizostigma; vernal *(Baker)*.

Crocus hyemalis, Boiss. and Blanche in Boiss. Diag. ser. 2, iv, p. 93; Boiss., Fl. Orient., vol. v, part 1, p. 106; Tchihatcheff, Asie Min., part iii, Bot., vol. ii, p. 521; Baker, Rev. Sp. Crocus in Gard. Chron. 1873, p. 680; List Crocus in Journ. R. Hort. Soc. Lond., new ser., vol. iv, 1877; and Syst. Iridac. in Journ. Linn. Soc., Bot., vol. xvi, p. 84; G. Maw in Gard. Chron. 1879, p. 234; Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, p. 559; in The Garden, vol. xxi, num. 532, p. 68; Hist. Crocus in Journ. Linn. Soc., Bot., vol. xix, p. 373.

Var. *Foxii*, G. Maw, Boiss., Fl. Orient., vol. v, part i, p. 106.

Cormus $\frac{1}{2}$—$\frac{2}{3}$ poll. (0.013—0.017 metr.) latus et altus. Tunica, membrana tenuis sericea ad basin in laciniis angustis fibrosis (nec fibris veris) fissa, ad apicem cormi in cuspidibus paucis brevissimis producta. Vaginæ quam spathæ breviores. Scapi plures. Folia glabra flore æqualia, $\frac{1}{8}$ poll. (0.0032 metr.) lata, matura semipedalia. Spatha diphylla. Perianthium: faux flava, haud barbata. Segmenta $1\frac{1}{4}$ poll. (0.032 metr.) longa, $\frac{1}{3}$ poll. (0.0084 metr.) lata, alba, linea purpurea in medio, et 3—4 breviora apud faucem. Antheræ aurantiacæ, filamentis aurantiacis bis æquantes. Stylus apud faucem fissus. Stigmata ramulosa capillacea, antheris æqualia.

Corm from half an inch (0.013 metre) to two-thirds of an inch (0.017 metre) broad and high. *Tunic* of fine silky membrane, splitting up at the base into narrow fibre-like sub-divisions.

Sheathing Leaves about four, from half an inch (0.013 metre) to two and a half inches (0.063 metre) in length, shorter than the proper spathes, and containing several scapes.

Proper Leaves from four to seven, reaching above the flowers at the flowering-time, and produced to a length of fifteen or eighteen inches (0.375—0.450 metre) at the maturity of the capsule, one-eighth of an inch (0.0032 metre) broad, glabrous, the keel one-third the width of the blade, the lateral channels without ridges.

Proper Spathe diphyllous, an inch and a half (0.038 metre) in length, the inner spathe ligulate, the outer tubular, exceeding the sheathing leaves, and reaching nearly to the throat.

Perianth: Tube about two inches (0.050 metre) in length from the ovary to the throat. *Throat* yellow, unbearded. *Segments* about an inch and a quarter (0.032 metre) long, and one-third of an inch (0.0084 metre) broad, white, and veined with rich purple lines towards the base. In var. *Foxii* the outer surface of the outer segments are freckled and suffused with purple.

Stamens five-eighths of an inch (0.016 metre) high; the orange *Anthers* about twice the length of the orange *Filament*. In var. *Foxii* the anthers are black.

Pistil from five-eighths of an inch (0.016 metre) to three-quarters of an inch (0.019 metre) high from the throat, reaching to, or somewhat exceeding, the level of the summit of the anthers; the *Style* dividing at the level of the base of the anthers, and produced into about eight or ten orange capillary, stigmatic divisions.

Scape about an inch and a half (0.038 metre) in height at the flowering-time, and produced to a length of three or four inches (0.075—0.100 metre) at the maturity of the capsule; there are several scapes within each set of sheathing leaves.

Capsule about half an inch (0.013 metre) high, and a third of an inch (0.0084 metre) broad.

Seed unknown.

Crocus hyemalis is essentially a mid-winter species, flowering from the end of November, through December, to the early part of January. It is limited to Palestine and the borders of Syria. Its recorded habitats range between 31° and 34° north latitude, and 35° and $36\frac{1}{2}$° east longitude. It has a more southern range than any other Crocus. Monsieur Barbey gathered it on the southern slope of a

Fig. 1, Dec.r

Fig 7 × 2

Fig. 2, May 11th

CROCUS HYEMALIS, *Boiss. & Blanche.*
and var. FOXII, *G. Maw.*

G. Maw del.

F. Huth, Lith.r Edin.r

rocky limestone hill, ten kilometres south of Hebron (latitude 31° 25′ north, longitude 31° 25′ east). Its other recorded habitats are the Campo di Pastori, near Bethlehem; the neighbourhood of Jerusalem, where it is said to be common; at Der Diwân near Jericho, where the black anthered variety *C. Foxii* occurs; on Mount Gerizim, Judea; on a rocky hill to the north-east and also to the south of Skanderoun (Iskanderûn); at Sahara, between Dimar and Damascus, north-east of Saida, at an altitude of between six hundred and seven hundred metres; on rocky ground above the village of Ksior Fasserch, near Saida; near the Ouadi el Harir, between Beyrout and Damascus, and in a cemetery near Beyrout. Some of the latter and more northern reputed habitats may refer to *C. Gaillardotii*, with which this species has been confounded.

I have twice been favoured by Mr. N. T. Moore, Her Majesty's Consul at Jerusalem, with liberal supplies of the corms of *C. hyemalis;* Monsieur Barbey of Valeyres also sent me roots from the neighbourhood of Hebron; and to Mr. H. Fox I am indebted for roots of the black anthered variety *Foxii* from the neighbourhood of Jericho. I have occasionally flowered it from each of these sources; but experience shows that it is difficult of cultivation, and a shy-flowering species.

REFERENCES TO PLATE XLIII.

Fig. 1. Flowering-state, December, actual size.
Fig. 2. With matured leaves and capsule, May 11th, actual size.
Fig. 3. Diagrammatic dissection of scape, ovary, and spathes, actual size.
Fig. 4. Stamens and Pistil, magnified two-fold.
Fig. 5. Stigmata, magnified six-fold.
Fig. 6. Section of leaf, magnified six-fold.
Fig. 7. Corm tunic, magnified two-fold.
Fig. 8. Flower of var. *Foxii*, actual size.
Fig. 9. Stamens and Pistil of var. *Foxii*, magnified two-fold.

Mount Hermon.

44. CROCUS HERMONEUS.

Section: Nudiflori; membranacei *(Herbert)*.

Crocus hermoneus, Th. Kotschy, Exsic. Vienna Herbarium, No. 990, Iter Syriacum, 1855. G. Maw, Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, p. 559; in The Garden, vol. xxi, No. 532, p. 68; and Hist. Crocus in Journ. Linn. Soc., Bot., vol. xix, p. 373; Boiss., Fl. Orient., vol. v, part i, p. 115.

Cormus prolatus pyriformis vix $\frac{1}{2}$ poll. (0.013 metr.) latus et $\frac{3}{4}$ (0.019 metr.) altus, (latitudo pro altitudine minor quam in ulla specie). Tunica, membrana tenuis fibris parallelis subreticulatis commixta, pileus in fasciculo cuspidum fibro-membranaceorum $\frac{1}{3}$ poll. (0.0084 metr.) productus. Tunica basalis fibris planis radiatis. Vaginæ quam spatha breviores. Folia glabra, ad fructificationem 7—9 poll. (0.175—0.225 metr.) longa, $\frac{1}{8}$—$\frac{1}{6}$ poll. (0.0032—0.0042 metr.) lata, marginibus laminæ revolutis, carina quam laminæ $\frac{3}{4}$ angustior, in canaliculis lateralibus 3—4 costis. Spatha diphylla, 2—$2\frac{1}{2}$ poll. (0.050—0.063 metr.) longa. Scapus fructiferus $2\frac{1}{2}$—$3\frac{1}{2}$ poll. (0.063—0.088 metr.) Capsula ferme 1 poll. (0.025 metr.) longa.

Corm prolate, pyriform, half an inch (0.013 metre) broad, and three-quarters of an inch (0.019 metre) high. *Tunic* of thin membrane combined with fine parallel fibres tending to a reticulated arrangement. *Basal Tunic* of flattened radiating fibres.

Sheathing Leaves three or four, from half an inch (0.013 metre) to three or four inches in length (0.075—0.100 metre).

Proper Leaves three or four, ten or eleven inches (0.250—0.275 metre) in length at the maturity of the capsule, one-eighth to one-sixth of an inch (0.0032—0.0042 metre) broad, glabrous, the keel one-fourth the width of the blade, the lateral channels containing three or four low ridges.

Proper Spathe diphyllous, from two to two and a half inches (0.050—0.063 metre) in length.

Flower unknown.

Scape from two and a half to three and a half inches (0.063—0.088 metre) in height at the fruiting-time.

Capsule about an inch (0.025 metre) in height, and one-third of an inch (0.0084 metre) broad.

Crocus hermoneus was discovered by Theo. Kotschy amongst the melting snow, at an altitude of nine thousand feet, near the summit of Mount Hermon (latitude 33° 25′ north; longitude 35° 45′ east), during his Syrian journey in 1855. The only specimens I have seen are those in the fruiting-state preserved in the Vienna Herbarium; these are represented on Plate XLIV. No date accompanies the specimens, which are the only available examples for description; but probably they were gathered in the late spring or early summer, and the species is in all likelihood vernal.

It appears distinct from any other known Syrian species; the corm tunic somewhat resembling that of *C. hyemalis*.

REFERENCES TO PLATE XLIV.

Fig. 1. With matured leaves and capsule, actual size.
Fig. 2. Diagrammatic dissection of scape, ovary, and spathes, actual size.
Fig. 3. Section of leaf, magnified six-fold.
Fig. 4. Corm tunics, magnified two-fold: *a*, cap; *b*, main tunic; *c*, basal tunic.

CROCUS HERMONEUS, *Kotschy.*

J. Maw del.

F. Ruth. Imp. Edinr.

45. CROCUS ALATAVICUS.

Section: Nudiflori; parallelo-fibriosi *(Herbert)*: Holostigma; vernal *(Baker)*.

Crocus alatavicus, Regel and Semenow, in Regel's Pl. Semenovianæ, iv, No. 1036, Bull. de Mosc. 1869; and Enum. Pl. Semenow, p. iii; Regel in Gartenflora, 1877, p. 103, tab. 906, fig. i; and Descriptiones Plant, Nov. 1877, Fasc. v, p. 46; and 1879, Fasc. vii, p. 212; Baker in Gard. Chron., new ser., January 26th, and February 23rd, 1878, p. 234; and Syst. Iridac. in Journ. Linn. Soc., Bot., vol. xvi, p. 82; G. Maw in The Garden, vol. xvi, num. 364, p. 420, plate cliii; vol. xxi, num. 532, p. 68; Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, p. 559; and Hist. Crocus in Journ. Linn. Soc., Bot., vol. xix, p. 373.

? *C. Sieberi*, var., Baker, List Crocus in Journ. R. Hort. Soc. Lond., new ser., vol. iv, 1877.

Var. *ochroleucus*, (not *C. ochroleucus*, Boiss. and Blanche) Baker in Gard. Chron., February 23rd, 1878, p. 234. *β, albus*, Regel, Descriptiones Plant., Nov. 1879, Fasc. vii, p. 212.
(Var. *porphyreus*, Baker, figured in The Garden, plate cliii, is the later and faded condition of the type form.)

Cormus oblatus $\frac{1}{2}$—$\frac{3}{4}$ poll. (0.013—0.019 metr.) latus, $\frac{1}{2}$ poll. (0.013 metr.) altus. Tunica fibris parallelis membrana tenui commixtis. Vaginæ quam spathæ breviores. Scapi plures. Folia 6—9, ad florationem visa, matura pedalia (0.300 metr.), $\frac{1}{16}$ poll. (0.0016 metr.) lata, marginibus carinæ et laminæ ciliolatis, carina lata, quam lamina triente angustior. Spatha diphylla, quam faux $1\frac{1}{2}$ poll. (0.038 metr.) brevior. Perianthium: faux glabra, flava; segmenta $1\frac{1}{2}$ poll. (0.038 metr.) longa, $\frac{1}{2}$ poll. (0.013 metr.) lata, alba, segmenta tria exteriora extus obscure purpureo ornata vel pallide ochrea. Antheræ aurantiacæ, filamenta aurantiaca superantes. Stylus aurantiacus ad basin vel in medio antherarum fissus. Stigmata aurantiaca integra sæpius antheris breviora. Semina oblonga glabra, splendide ochrea, matura apice viridia.

Corm from half an inch (0.013 metre) to three-quarters of an inch (0.019 metre) broad, and about half an inch (0.013 metre) high. *Tunic* of parallel fibres combined with thin membrane.

Sheathing Leaves about five, from half an inch (0.013 metre) to three and a half inches (0.088 metre) in length, enclosing one or more scapes.

Proper Leaves from six to nine, just appearing with the flowers, and produced to a foot (0.300 metre) in length at maturity, one-sixteenth of an inch (0.0016 metre) broad, ciliated on the margins of the blade and keel; the keel more than half the width of the blade.

Proper Spathe diphyllous, about two inches (0.050 metre) in length, exceeding the sheathing leaves, and reaching to within an inch and a half (0.038 metre) of the throat, the inner spathe ligulate, the outer tubular.

Perianth: Tube four inches (0.100 metre) in length from the ovary to the throat. *Throat* unbearded, yellow. *Segments* about an inch and a half (0.038 metre) long, and half an inch (0.013 metre) broad, white; the outer surface of the outer segments freckled and obscurely feathered with purple, or self-coloured, coated with buff.

Stamens from three-quarters of an inch to an inch (0.019—0.025 metre) high; the orange *Anthers* about the same length as, or a little longer than the orange *Filament*. *Pollen Grains* glabrous, orange, $\frac{1}{370}$ of an inch (0.00007 metre) in diameter.

Pistil five-eighths of an inch (0.016 metre) in height from the throat, shorter than, or reaching to, the level of the stamens; the orange *Style* dividing at the level of the middle of the anthers, and shortly produced into a compact mass of entire orange stigmata, which are generally below the level of the summit of the anthers.

Scape about two inches (0.050 metre) high at the flowering-time, produced to a height of two and a half or three inches (0.063—0.075 metre) at the maturity of the capsule; there are one or several scapes within each set of sheathing leaves.

Capsule two-thirds of an inch (0.017 metre) high, and one-third of an inch (0.0084 metre) broad.

Seed one-sixth of an inch (0.0042 metre) high, and one-tenth of an inch (0.0025 metre) broad, glabrous, bright buff, ripening to greenish brown: the chalaza, raphe, and caruncle of a paler colour than the body of the seed.

Crocus alatavicus is a native of the Ala Tau mountains and the neighbouring district in eastern Turkistan, latitude 54° north, and longitude 88° east, occurring at elevations up to seven thousand feet. Dr. Regel, in the VIIth Fasciculus of his *Descriptiones Plantarum*, records its habitats as follows:—"In pratis prope Wernoje (A. Regel, Fetisow), ad fluvium Almatinka minorem (A. Regel), Dschasil-kul, Bischkopa (Kuschakewicz), in trajectu Altinimel, Karatschoki ad fluvium Ili, in angustiis rivi Almatinka prope Kuldscha, et ad fluvium Borborogussun (A. Regel)", and the white variety, β. *albus* of Regel, *(ochroleucus* of Baker) in meadows near Wernoje.

The discovery of *C. alatavicus* in the Ala Tau mountains of Central Asia, longitude 88° east, and latitude 54° north, extended the range of the genus thirty-three degrees to the east, and five degrees to the north, of any species previously known. With the exception of the recently-discovered *C. Korolkowi*, from the neighbourhood of Samarkand, it is the only Crocus known to occur east of the Caspian. It flowers freely in cultivation during the latter half of February. Horticulturists are indebted to Dr. Regel for introducing this species to English gardens.

REFERENCES TO PLATE XLV.

Fig. 1. Flowering-state, February 26th, actual size.
Fig. 2. Inner surface of segment, actual size.
Fig. 3. Flower of var. *ochroleucus* (Baker), β. *albus* (Regel), actual size.
Fig. 4. With matured leaves and capsule, June 6th, actual size.
Fig. 5. Diagrammatic dissection of scape, ovary, and spathes, actual size.
Figs. 6 & 7. Stamens and Pistil, magnified two-fold.
Fig. 8. Pollen Grain, magnified one hundred and fifty-fold.
Fig. 9. Pistil, magnified six-fold.
Fig. 10. Section of leaf, magnified twelve-fold.
Fig. 11. Corm tunic, magnified two-fold.
Fig. 12. *a* & *b*, Seed, magnified six-fold.

Fig. 1, Feby 26th

Fig. 10 x 12

CROCUS ALATAVICUS, *Regel & Semenow.*

G. Maw del.

F. Huth, Lith. Edin.

DIVISION II.—NUDIFLORI. Continued.

Section II.—FIBRO-MEMBRANACEI. Continued.

Autumnal, with a corm tunic of membranous tissue or of membranous tissue interspersed with nearly parallel fibres.

Flowers lilac or white.

The five flowering autumnal species—

46. C. caspius,
47. C. Tournefortii,
47*b*. C. Boryi,
48. C. veneris,
49. C. lævigatus,

form a natural group, to which no other species are nearly allied. All have white anthers and capillary stigmata. The first four have thin fibro-membranous corm tunics; and the last, *C. lævigatus*, being readily distinguished from the others by its hard coriaceous tunic. All of the five species are remarkable for the small number of roots produced from the base of the corm.

46. CROCUS CASPIUS.

Section: Nudiflori; parallelo-fibrosi *(Herbert)*: Odontostigma?; autumnal *(Baker)*.

Crocus caspius, Fischer and Meyer in Hohen. Enum. Talysch. p. 22; Ledeb. Fl. Ross. iv, p. 110; Baker, Rev. Sp. Crocus in Gard. Chron. 1873, p. 1466; List Crocus in Journ. R. Hort. Soc., new ser., vol. iv, 1877; and Syst. Iridac. in Journ. Linn. Soc., Bot., vol. xvi, p. 84; G. Maw, Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, p. 559; in The Garden, vol. xxi, No. 532, p. 68; and Hist. Crocus in Journ. Linn. Soc., Bot., vol. xix, p. 373; Boiss., Fl. Orient. vol. v, part. 1, p. 110.

C. Boryanus in part, Herbert, Hist. Crocus, Sp. 43, p. 45; from Journ. Hort. Soc. Lond., vol. ii, p. 291.

Cormus ovoideus, $\frac{1}{2}$—$\frac{3}{4}$ poll. (0.013—0.019 metr.) latus, $\frac{3}{4}$ poll. (0.019 metr.) altus. Tunica membranacea brunnea apud basin fibrosa; tunica basalis fibris brevibus radiatis confecta. Vaginæ quam spathæ breviores, vix ovarium superantes. Folia 4—5, glabra, angustissima, $\frac{1}{16}$ poll. (0.0016 metr.) lata, floribus in autumno æquantia. Spatha diphylla. Perianthium: faux aurantiaca, glabra, (parce pubescens fide Bakeri). Segmenta alba versus faucem flavescentia, 1—$1\frac{1}{4}$ poll. (0.025—0.032 metr.) longa, $\frac{1}{2}$ poll. (0.013 metr.) lata. Antheræ pallide flavæ vel ochroleucæ filamenta bis superantes. Stylus supra antheras fissus; stigmata angustissima patula integra flava antheras multo superantia.

Corm ovoid, half an inch (0.013 metre) to three-quarters of an inch (0.019 metre) broad, and three-quarters of an inch (0.019 metre) high. *Tunic* a rich brown membrane, fibres towards the bottom. *Basal Tunic* of short radiating fibres on a membranous base.

Sheathing Leaves about four, from half an inch (0.013 metre) to two inches (0.050 metre) in length, scarcely reaching to the level of the ovary.

Proper Leaves four or five, reaching to the level of the flowers at the flowering-time, one-sixteenth of an inch (0.0016 metre) broad, glabrous.

Proper Spathe diphyllous, an inch and a half (0.038 metre) in length, much exceeding the sheathing leaves, and reaching to within an inch (0.025 metre) of the throat.

Perianth: Tube about two and a half inches (0.063 metre) in length from the ovary to the throat, yellow. *Throat* unbearded (?) yellow. *Segments* an inch to an inch and a quarter (0.025—0.032) metre) long, and one-third of an inch (0.0084 metre) broad, white, and yellowish towards the throat.

Stamens shorter than the pistil, three-quarters of an inch (0.019 metre) high; the pale yellow *Anthers* about twice the length of the *Filament*.

Pistil about an inch (0.025 metre) high from the throat; the *Style* dividing above the summit of the anthers, and shortly produced into yellow, entire, spreading stigmata.

Scape at the flowering-time from an inch and a half to two inches (0.038—0.050 metre) high.

Capsule and *Seed* unknown.

Crocus caspius is allied to *C. Boryi* with which Herbert associated it; but it is readily distinguished from that species by its unbranched spreading stigmata. It was discovered by Hohenacker in 1838, on the western and southern coasts of the Caspian, and has been collected in northern Persia and Georgia. It has been recorded from near Astrabad, in shady places under bushes near the shore of the Caspian, where, according to Colonel Beresford Lovett, it is known under the native name of "Gul shir páuir"; from Mazanderan Resht, Astara, Lenkoran, Baku, and Astrakhan, but there is some doubt about its occurrence in the last named locality. Omitting this, its range of latitude would be between $36\frac{1}{2}^{\circ}$ and $40\frac{1}{2}^{\circ}$ north, and of longitude, between $48\frac{1}{2}^{\circ}$ and $54\frac{1}{2}^{\circ}$ east. If it occurs at Astrakhan, its range of latitude must be extended six degrees further north. It commences to flower in October and November, and Colonel Beresford Lovett, late Her Majesty's Consul at Astrabad, informs me that it continues in flower up to April. It has never been in cultivation; some roots Colonel Lovett procured for me in the late autumn of 1881, having been lost in transit.

REFERENCES TO PLATE XLVI.

Fig. 1. Flowering-state, autumnal, actual size.
Fig. 2. Diagrammatic dissection of scape, ovary, and spathes, actual size.
Fig. 3. Pistil, magnified six-fold.
Fig. 4. Stamens and Pistil, magnified two-fold.

Fig. 1, autumnal

Fig. 2

Fig. 3

Fig. 4

CROCUS CASPIUS, *Fischer & Meyer.*

G. Maw del

P. Huth, Lith. Edin.

From Ialyssus, Rhodes. From a sketch by C. G. Danford, Esq.

47. CROCUS TOURNEFORTII.

Section: Nudiflori; parallelo-fibrosi *(Herbert)*: Schizostigma; autumnal *(Baker)*.

Crocus Tournefortii, Gay in Féruss. Bull. Sc. Nat., vol. xxv, p. 320, (220); Tchihatcheff Asie Min., part iii, Bot., vol. ii, p. 521; Klatt Revis. Irid. in Linnæa, vol. xxxiv, p. 684; G. Maw, Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, p. 552; in The Garden, vol. xxi, No. 532, p. 69; Hist. Crocus in Journ. Linn. Soc., Bot., vol. xix, p. 373; Boiss., Fl. Orient., vol. v, part i, p, 109.

C. Tournefortianus, Herbert in Bot. Reg. 1845, vol. xxxi, tab. 37, fig. 3; and Misc. p. 6; Hist. Crocus, Sp. 42, p. 45; from Journ. Hort. Soc. Lond., vol. ii, p. 291; and drawing Lindl. Libr. R. Hort. Soc. Lond.

C. parvulus, Herbert, Bot. Mag.; and drawing in Lindl. Libr. R. Hort. Soc. Lond.

C. pholegandrus, Orphanides, exsic.

C. Orphanidis, J. D. Hooker in Bot. Mag. 1869, tab. 5776.

C. Boryi, var. 2, *Tournefortii*, Baker, Rev. Sp. Crocus in Gard. Chron., new ser., 1873, p. 1533; List Crocus in Journ. R. Hort. Soc. Lond., new ser., vol. iv, 1877; and Syst. Iridac. in Journ. Linn. Soc., Bot., vol. xvi, p. 84.

C. Boryi var. 3, *Orphanidis*, Baker, Rev. Sp. Crocus in Gard. Chron., new ser., 1873, p. 1533; List Crocus in Journ. R. Hort. Soc. Lond., new ser., vol. iv, 1877; and Syst. Iridac. in Journ. Linn. Soc., Bot., vol. xvi, p. 84.

Cormus $\frac{3}{4}$ poll. (0.019 metr.) altus et latus. Tunica, membrana mollis brunnea fibris intermixta, versus basin fissa. Vaginæ ovario æquantes, spathis breviores. Folia præfloralia et ad florationem, flores multo superantia, glabra, $\frac{1}{10}$ poll. (0.0025 metr.) lata, in vere 14—15 poll. (0.350—0.375 metr.) longa. Spatha diphylla fauce æquans. Perianthium: faux aurantiaca, glabra; segmenta $1\frac{1}{8}$ poll. (0.038 metr.) longa, vix $\frac{1}{2}$ (0.013 metr.) lata, splendide lilacina, venis paucis purpureis ad basin, vel venis penniformibus purpureis leviter (haud obscuro ut in *C. lævigato*) ornata. Antheræ parvæ, albæ, quam filamenta aurantiaca paullo longiores. Stylus ad basin antherarum fissus. Stigmata laxa patula, ramulosa coccinea, antheras multo superantia. Semina obscure rufa, papillosa.

Corm three-quarters of an inch (0.019 metre) to an inch (0.025 metre) wide and high. *Tunic* of soft brown membrane combined with parallel fibres, splitting up towards the base.

Sheathing Leaves about three, from half an inch (0.013 metre) to two inches (0.050 metre) in length, falling short of the proper spathes.

Proper Leaves from four to six, preceding the flowers, reaching above the level of the flowers at the flowering-time, and produced in the spring to a length of a foot or fifteen inches (0.300—0.375 metre) one-tenth of an inch (0.0025 metre) wide, glabrous, the keel one-third the width of the blade, the lateral channels without ridges.

Proper Spathe diphyllous, nearly two inches (0.050 metre) in length, exceeding the sheathing leaves, and reaching nearly to the throat, the outer spathe tubular, the inner spathe ligulate.

Perianth: Tube about two inches (0.050 metre) in length from the ovary to the throat. *Throat* glabrous, orange. *Segments* about an inch and a half (0.038 metre) long, and barely half an inch (0.013 metre) broad, uniform bright lilac, with a few purple veins towards the base.

Stamens about half an inch (0.013 metre) high, shorter than the pistil; the white *Anthers* about twice the length of the densely pubescent orange *Filament*. *Pollen Grain* $\frac{1}{450}$ of an inch (0.00006 metre) in diameter, white.

Pistil from an inch to an inch and a quarter (0.025—0.032 metre) in height from the throat; the *Style* dividing at the level of the anthers, and produced into lax, spreading, finely divided scarlet stigmata, which much exceed the anthers.

Scape about an inch and three-quarters (0.044 metre) in height at the flowering-time.

Capsule about three-quarters of an inch (0.019 metre) high, and one-third of an inch (0.0084 metre) broad.

Seed one-seventh of an inch (0.0036 metre) high, and one-tenth of an inch (0.0025 metre) broad, dark red, papillose; the chalaza, raphe and caruncle of the same colour as the body of the seed.

CROCUS TOURNEFORTII, *Gay.*

C. Tournefortianus, Herbert. *C. Orphanidis, J. D. Hooker.*

C. pholegandrus, Orphanides. *C. Boryi, var. Tournefortii, Baker.*

C Mawe del

F Huth, Lith.r Edin.r

Crocus Tournefortii is a native of, and is probably limited to, the islands of the Greek Archipelago, between latitude 36° and 37½° north, and longitude 23½° and 28° east. It has been recorded from the islands Hydra (Idra), Thermia (Thermo, Kythnos), Melos (Milo), Syra, Pholegandros (Polykandro), Tinos (Tino, Tenos), and Rhodes, near the path by the sea to the village of Triandra. There are also records of its having been found in the Morea, and in Thrace, near the Quarantine station of Zeitun (Zeitan); but about these some doubt exists. After examining Gay's type specimen of *C. Tournefortii* from Melos, preserved in the De Candolle Herbarium at Geneva, I find that the plant figured and described in the *Botanical Magazine* (Tab. 5776) from the neighbouring island of Pholegandros, as *C. Orphanidis*, is identical with it.

C. Tournefortii is nearly allied to *C. Boryi;* but its lilac flowers and densely pubescent filaments are constant characters which readily distinguish it from that species. The leaves appear in the autumn before the flowers, which are freely produced from the end of October through November.

REFERENCES TO PLATE XLVII.

Fig. 1. Flowering-state, November, actual size.
Fig. 2. Inner surface of segment, actual size.
Fig. 3. With matured leaves, May 10th, actual size.
Fig. 4. Diagrammatic dissection of scape, ovary, and spathes, actual size.
Fig. 5. Stamens and Pistil, magnified two-fold.
Fig. 6. Pollen Grain, magnified one hundred and fifty-fold.
Fig. 7. Stigmata, magnified six-fold.
Fig. 8. Filament, magnified ten-fold
Fig. 9. Sections of leaf, magnified six-fold.
Fig. 10. Seed, June 2nd, magnified six-fold.
Fig. 11. Corm tunics, magnified two-fold: *a*, cap; *b*, main tunic.

47*b*. CROCUS BORYI.

Section: Nudiflori; parallelo-fibrosi *(Herbert)*: Schizostigma; autumnal *(Baker)*.

Crocus Boryi, Gay in Féruss. Bull. Sc. Nat. 1831, vol. xxv, p. 320 (220); and two drawings Bibl. J. D. Hooker; Bory and Chaub. Exped. Morée, p. 21, tabs. 2 and 3; Moore in Fl. Mag. 1850, p. 273, cum icones; Klatt Revis. Irid. in Linnæa, vol. xxxiv, p. 685; Baker, Rev. Sp. Crocus in Gard. Chron., new ser., 1873, p. 1535; List Crocus in Journ. R. Hort. Soc. Lond., new ser., vol. iv, 1877; and Syst. Iridac. in Journ. Linn. Soc., Bot., vol. xvi, p. 84; G. Maw, Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, p. 559; in The Garden, vol. xxi, num. 532, p. 69; and Hist. Crocus in Journ. Linn. Soc., Bot., vol. xix, p. 373; Boiss., Fl. Orient., vol. v, part i, p. 110.

C. Boryanus, Herbert in Bot. Reg., 1847, vol. xxxiii, tab. xvi, fig. 10; and drawing in Lindl. Libr. R. Hort. Soc. Lond.

C. ionicus, Herbert in Bot. Reg. 1845, vol. xxxi, misc. p. 3.

Var. *marathoniseus*, G. Maw, Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, p. 559; and in The Garden, vol. xxi, num. 532, p. 69.

C. marathoniseus, Heldr. 1852, Pl. Exsic., num. 2806; and Pl. Nov. Hellen. in Nuov. Giorn. Bot. Ital., 1875, vol. vii, num. 4, p. 11.

C. Boryi in part, Baker, Syst. Iridac. in Journ. Linn. Soc., Bot., vol. xvi, p. 84.

Cormus $\frac{1}{2}$—$\frac{3}{4}$ poll. (0.013—0.019 metr.) latus et altus. Tunica membranacea tenuis brunnea mollis, fibris intermixta. Vaginæ ovario æquantes, quam spathæ breviores. Folia præfloralia, ad florationem flores superantia, glabra, $\frac{1}{10}$ poll. (0.0025 metr.) lata, in vere pedalia (0.300 metr.) Spatha diphylla, fauce æquans. Perianthium: faux glabra, insigne aurantiaca; segmenta $1\frac{1}{4}$—$1\frac{1}{2}$ poll. (0.032—0.038 metr.) longa, vix $\frac{1}{2}$ poll. (0.013 metr.) lata, alba, raro lineis purpureis paucis ad basin. Antheræ parvæ albæ, quam filamenta aurantiaca paullo longiores. Stylus prope basin antherarum fissus; stigmata laxa, patentia ramulosa coccinea antheras multo superantia. Semina fusco-rubra papillosa.

Corm from three-quarters of an inch (0.019 metre) to an inch (0.025 metre) broad and high. *Tunic* of thin membrane, interspersed with fine parallel fibres; the *Cap* produced upwards to a height of three-quarters of an inch (0.019 metre) above the summit of the corm.

Sheathing Leaves about four, from half an inch (0.013 metre) to two and a half inches (0.063 metre) in height, falling short of the proper spathe.

Proper Leaves from five to seven, reaching above the flowers at the flowering-time, and produced in the spring to a length of fifteen to eighteen inches (0.375—0.450 metre), one-tenth of an inch (0.0025 metre) broad, glabrous, the keel one-third the width of the blade.

Proper Spathe diphyllous, from two to two and a half inches (0.050—0.063 metre) in length, exceeding the sheathing leaves, and reaching to within an inch (0.025 metre) of the throat; the outer spathe tubular, the inner spathe ligulate.

Perianth: Tube about two and a half inches (0.063 metre) in length from the ovary to the throat, yellow. *Throat* unbearded, orange. *Segments* from an inch and a quarter (0.032 metre) to an inch and three-quarters (0.044 metre) in length, and about half an inch (0.013 metre) broad, creamy-white, yellow towards the base, and occasionally delicately feathered with purple.

Stamens about half an inch (0.013 metre) high, much shorter than the pistil; the white *Anthers* a little longer than the slightly papillose orange *Filament*. *Pollen Grains* $\frac{1}{400}$ of an inch (0.0006 metre) in diameter, white, papillose.

Pistil about an inch (0.025 metre) high from the throat, reaching high above the anthers; the *Style* dividing at the level of the middle or base of the anthers, and produced into lax, spreading, finely divided scarlet stigmata. In var. *marathoniseus* the stigmata are less branched than in the type, and reach only to the level of the summit of the anthers.

Scape at the flowering-time about two inches (0.050 metre) high.

Capsule about three-quarters of an inch (0.019 metre) long, and one-third of an inch (0.0084 metre) broad.

Seed one-eighth of an inch (0.0032 metre) high, and one-tenth of an inch (0.0025 metre) broad, papillose, red; the chalaza, raphe and caruncle of the same colour as the body of the seed.

Crocus Boryi is an abundant species throughout the Morea and the islands of the Ionian and Ægean Seas to the west and east. It has been recorded from Mount St. Nicolo, Patras; Navarino, Modon, lower parts to the south and west of Mount Taygetus, Mounts Evas and Ithorne, the neighbourhood of the Gulf of Coron, and near Marathonise (Gythium) in the Morea. Its most north-western range is the Island of Corfu, where at Santa Decca, Garuna, and Pellica it is extremely abundant. It has also been recorded from the Island of Santa Maura, from Monte Nero in Cephalonia, Monte Skopò in Zante, and from the Island of Syra, where I gathered it abundantly intermixed with *C. Tournefortii* and *C. lævigatus*.

Its ascertained range of latitude is between 36½° and 40° north, and of longitude between 19½° and 25° east. Herbert refers to a white autumnal Crocus seen by Forbes and Spratt on the lower flanks of Mount Massicytus, in Lycia, which he thinks may be this species.

In *Crocus marathoniscus*, of Heldreich, I can find no departure from *C. Boryi* except in the stigmata (Fig. 4. *d*), which are less branching than in the type, and only reach to the level of the summit of the anthers; I place it therefore as a variety only of *C. Boryi*.

Crocus Boryi is nearly allied to *C. Tournefortii*, but is readily distinguished by its filaments (Fig. 8), which are but slightly papillose, instead of being pubescent, and by its white flowers. An occasional variety (Fig. 1. *a*) is sometimes found with delicate lilac featherings on the outer surface of the outer segments.

It is a species, though easily cultivated, less robust than many other autumnal Croci; and from the lateness of its flowering-time is best grown to advantage under the protection of a cold frame.

REFERENCES TO PLATE XLVII*b*.

Fig. 1. Flowering-state, November, actual size.
Fig. 1*a*. Feathered varieties; outer surface of outer segments, actual size.
Fig. 2. With matured leaves, May 9th, actual size.
Fig. 3. Diagrammatic dissection of scape, ovary, and spathes, actual size.
Fig. 4. *b* and *c*. Stamens and Pistil of type, magnified two-fold.
Fig. 4. *d*. Stamens and Pistil of variety *marathoniseus*, magnified two-fold.
Fig. 5. Pollen Grain, magnified one hundred and fifty-fold.
Figs. 6 & 7. Stigmata, magnified six-fold.
Fig. 8. Filament, magnified ten-fold.
Fig. 9. Section of leaf, magnified six-fold.
Fig. 10. Ripe capsule, actual size.
Fig. 11. Seed, magnified six-fold.
Fig. 12. Corm tunic, magnified two-fold.

Fig 9 × 6.

Fig. 12 × 2

CROCUS BORYI, *Gay.*

C. Boryanus, Herbert.

J. Mew del.

F. Huth, Lith.r Ed.r

Pilla-Pais Monastery, Cyprus.

48. CROCUS VENERIS.

Section: Nudiflori; parallo-fibrosi *(Herbert)*: Schizostigma; autumnal *(Baker)*.

Crocus veneris, Tappeiner in Poech. Enum. Pl. Cypr.; G. Maw, Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, p. 559; in The Garden, vol. xxi, num. 532, p. 69; and Hist. Crocus in Journ. Linn. Soc., Bot., vol. xix, p. 373; Boiss., Fl. Orient., vol. v, part i, p. 109.

C. cretensis, Körnicke in Flora 1856, 409.

C. Boryi, in part, Herbert, Hist. Crocus, sp. 43, p. 45; from Journ. Hort. Soc. Lond., vol. ii, p. 291;

Baker, Rev. Sp. Crocus in Gard. Chron., new ser., 1873, p. 1533; List Crocus in Journ. R. Hort., Soc. Lond., new ser., vol. iv, 1877; and Syst. Iridac. in Journ. Linn. Soc., Bot., vol. xvi, p. 84.

Cormus pyriformis, $\frac{5}{8}$ poll. (0.016 metr.) latus, $\frac{3}{4}$ poll. (0.019 metr.) altus. Tunica, membrana tenuis cum fibris parallelis versus basin fissa confecta. Vaginæ ovario æquantes, quam spatha breviores, scapos 2 vel plures involentes. Folia 5—7, glabra, 2—3 poll. (0.050—0.075 metr.) longa ad florationem, floribus æquantia, $\frac{1}{20}$ poll. (0.0013 metr.) lata, carina angusta, canaliculis lateralibus sine costis. Spatha diphylla, $1\frac{1}{4}$ poll. (0.032 metr.) longa, fauce vix æquans. Perianthium: faux flava, haud barbata; segmenta alba, rarius exteriora extus purpurata, sæpius lineis 2—3 tenuibus in basin ornata, minima, $\frac{3}{4}$ poll. (0.019 metr.) longa, $\frac{1}{6}$ poll. (0.0042 metr.) lata. Antheræ albæ, $\frac{1}{2}$ poll. (0.013 metr.) longæ, quam filamenta pallide flava bis longiores. Stylus in media antherarum fissus, stigmata 10—12 capillacea aurantiaca antheras superantia.

Corm pyriform, about five-eighths of an inch (0.016 metre) broad, and three-quarters of an inch (0.019 metre) high. *Tunic* of thin membrane combined with fine parallel fibres, and splitting up at the base.

Sheathing Leaves three or four, from a quarter of an inch to an inch and a half (0.0063—0.038 metre) in length, falling short of the proper spathes, and enclosing two or more scapes.

Proper Leaves from five to seven, two or three inches (0.050—0.075 metre) long, and reaching to the level of the flowers, one-twentieth of an inch (0.0013 metre) wide, glabrous, the keel about one-third the width of the blade, lateral channels without ridges.

Proper Spathe diphyllous, about an inch and a quarter (0.032 metre) in length, and reaching close up to the throat; the outer spathe tubular, the inner ligulate.

Perianth: Tube about an inch (0.025 metre) long from the ovary to the throat, yellowish towards the throat. *Throat* unbearded? yellow. *Segments* three-quarters of an inch (0.019 metre) long, and one-fifth of an inch (0.0050 metre) broad, white, yellowish towards the base. In the Cretan form the outer surface of the outer segments are occasionally feathered with purple.

Stamens shorter than the pistil, half an inch (0.013 metre) high; the white *Anthers* somewhat longer than the yellow *Filament*.

Pistil five-eighths of an inch (0.016 metre) high from the throat; the *Style* dividing at the level of the middle of the anthers, and produced into ten or twelve erect, orange, capillary, stigmatic divisions, which reach higher than the summit of the anthers.

Scape at the flowering-time about an inch (0.025 metre) in height; there are several scapes within each set of sheathing leaves.

Capsule and *Seed* unknown.

Both Herbert and Baker associate this species with *C. Boryi*, and, excepting in stature, it is difficult to point out any good distinguishing character. It is unquestionably identical with *C. cretensis* of Körnicke, of which the Berlin Herbarium contains specimens (Herb. Kunth) collected in Crete by Olivier and Brugnier in 1822, and another sheet of specimens under the name of *veneris*, collected in Crete by Fridvaldsky; these have the normal white flowers. I have also seen specimens

Fig 1, Nov^r 20^th
Cyprus

Fig 2, Crete

CROCUS VENERIS, *Typicus.*

C. cretensis, Körnicke.

from Crete in which (Fig. 2) the flower is feathered with purple. The plant is best known in Herbaria by the specimens collected by Kotschy on the 20th of November, 1840, on the slopes, between Ktima and the sea, of the hill country near Paphos, Cyprus. All Kotschy's specimens have white flowers, without the purple feathering which is occasionally found in the Cretan plant.

Crocus veneris has not yet been introduced to cultivation, and is only known to occur in Cyprus and Crete, between 24° and 34° east longitude, and $34\frac{1}{2}°$ and $35\frac{1}{2}°$ north latitude.

REFERENCES TO PLATE XLVIII.

Fig. 1. Flowering state, November 20th, Paphos, Cyprus, actual size.
Fig. 2. Variety from Crete, actual size.
Fig. 3. Diagrammatic dissection of scape, ovary, and spathes, actual size.
Fig. 4. Stamens and Pistil, magnified two-fold.
Fig. 5. Stigmata, magnified six-fold.
Fig. 7. Section of leaf, magnified six-fold.
Fig. 8. Corm tunic, magnified two-fold.

Modern Athens.

49. CROCUS LÆVIGATUS.

Section: Nudiflori; parallelo-fibrosi *(Herbert)*: Schizostigma; autumnal *(Baker)*.

Crocus lævigatus, Bory and Chaub. Exped. Morée, p. 2, plate 3, fig. 2; Herbert, Hist. Crocus, sp. 39, p. 43; from Journ. Hort. Soc. Lond., vol. ii, p. 289; and drawing in Lindl. Libr. R. Hort. Soc. Lond.; Tchihatcheff, Asie Min., part iii, Bot., vol. ii, p. 521; G. Maw, Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, p. 559; in The Garden, vol. xxi, num. 532, p. 69; and Hist. Crocus in Journ. Linn. Soc., Bot., vol. xix, p. 373; Boiss., Fl. Orient., vol. v, part i, p. 110.

Crocus Boryi, var. 1, *lævigatus*, Baker, Rev. Sp. Crocus in Gard. Chron., new ser., 1873, p. 1533; List Crocus in Journ. R. Hort. Soc., new ser., vol. iv, 1877.

Cormus pyriformis, $\frac{3}{4}$ poll. (0.019 metr.) latus et altus. Tunica coriacea, brunnea, basi serrata; tunica basalis parva irregularis discoidea, coriacea. Vaginæ ovarium paullo superantes, spatha breviores. Folia glabra, in auctumno primo visa, ad florationem floribus æquantia, matura 9—10 poll. (0.225—0.250 metr.) longa, $\frac{1}{10}$—$\frac{1}{8}$ poll. (0.0025—0.0032 metr.) lata. Spatha diphylla, brevissima, $1\frac{1}{4}$ poll. (0.032 metr.) longa. Perianthium: faux flava, glabra; segmenta alba vel lilacina; exteriora extus ochrea, varie purpureo-ornata, $1\frac{1}{4}$—$1\frac{1}{2}$ poll. (0.032—0.038 metr.) longa, $\frac{1}{2}$ poll. (0.013 metr.) lata. Antheræ albæ, filamentis flavis papillosis æquantes. Stylus in medio antherarum fissus, stigmata erecta fasciculata capillacea, flava vel aurantiaca, antheras multo superantes.

Corm pyriform, about three-quarters of an inch (0.019 metre) broad and high. *Tunic* strongly coriaceous, with a glabrous surface, dark brown in colour, splitting up at the base into superimposed series of vandyke sub-divisions; the *Basal Tunic* a small, irregular, coriaceous disc.

Sheathing Leaves about three, from half an inch to two and a half inches (0.013—0.063 metre) in length, just reaching above the ovary, and falling short of the proper spathes.

Proper Leaves four or five, appearing before the flowers, and reaching to the level of the flowers at the flowering-time, produced at maturity in the spring to a length of nine or ten inches (0.225—0.250 metre), from one-tenth to one-eighth of an inch (0.0025—0.0032 metre) broad, glabrous, the keel about one-third the width of the blade, the lateral channels without ridges.

Proper Spathe diphyllous, exceptionally short, about an inch and a quarter (0.032 metre) in length, slightly exceeding the sheathing leaves, and reaching to within an inch (0.025 metre) of the throat: the outer spathe tubular, the inner spathe ligulate.

Perianth: Tube about two inches (0.050 metre) in length from the ovary to the throat. *Throat* glabrous, yellow. *Segments* from an inch and a quarter to an inch and a half (0.032—0.038 metre) long, and half an inch (0.013 metre) broad, varying from white to lilac; the outer surface of the outer segments either self-coloured buff, or more generally variously feathered or suffused with rich purple.

Stamens shorter than the pistil, about five-eighths of an inch (0.016 metre) high; the white *Anthers* about the same length as the papillose orange *Filament*. *Pollen Grain* papillose, white, $\frac{1}{350}$ of an inch (0.00008 metre) in diameter.

Pistil from seven-eighths of an inch (0.022 metre) in height from the throat; the *Style* dividing at the level of the middle of the anthers, and produced into an erect bunch of the capillary divisions of the stigmata, which much exceed the anthers, and vary in colour from yellow to orange.

Scape from an inch and a half (0.038 metre) to an inch and three-quarters (0.044 metre) high at the flowering-time, produced to a height of two or three inches (0.050—0.075 metre) at the maturity of the capsule.

Capsule five-eighths of an inch (0.016 metre) high, and one-third of an inch (0.0084 metre) broad.

Seed red?

Crocus lævigatus is a native of the Morea, of the mountains about Athens, and of the Cyclades; and ranges in latitude between $36\frac{1}{2}°$ and $38\frac{1}{2}°$ north, and in longitude between 22° and 25° east; occurring from near the sea-level up to an altitude

CROCUS LÆVIGATUS, *Bory & Chaub.*

C. Boryi var. lævigatus, Baker.

Maw del.

Flowth. Low Edin.

of two thousand five hundred feet. It has been recorded from Hymettus, Corydalus, and Parnes (Ozea), near Athens; and from the islands of Thermia (Kythnos), Milo (Melos), and Syra, in the Greek Archipelago; and from Corfu; but as *C. lævigatus* and *C. Boryi* have often been confounded both in botanical gardens and in herbaria, I believe the record of its occurrence in Corfu refers to the latter species, which is very abundant there.

Crocus lævigatus is easily distinguished from any other species by its hard, coriaceous, polished corm tunic; while the stigmata are always more erect, and never lax and drooping as in those of *C. Boryi* and *C. Tournefortii*. It is very variable in its flower colouring, the segments ranging in tint from purple to white; the outer surface of the outer segments being variously striped and feathered, or evenly suffused with rich purple. It is a most desirable plant for garden cultivation, and one of the most ornamental of late autumnal species. The leaves appear before the flowers, towards the end of September; and the flowers from the end of October to Christmas, and often late into the spring, many flowers being produced from each corm.

REFERENCES TO PLATE XLIX.

Fig. 1. Flowering-state, October 28th, actual size.
Fig. 2. Inner surface of outer segment, actual size.
Fig. 3. Outer surface of outer segment, actual size.
Fig. 4. With matured leaves and capsule, June 21st, actual size.
Fig. 4 *a*. Capsule, actual size.
Fig. 5. Diagrammatic dissection of scape, ovary, and spathes, actual size.
Figs. 6 & 7. Stamens and Pistil, magnified two-fold.
Fig. 8. Pollen Grain, magnified one hundred and fifty-fold.
Fig. 9. Stigma, magnified eight-fold.
Figs. 10 & 11. Stigmata, magnified six-fold.
Fig. 12. Filament, magnified ten-fold.
Fig. 13. Section of leaf, magnified six-fold.
Fig. 14. Corm tunics, magnified two-fold: *b*, cap; *c*, main tunic; *d*, basal tunic.

WINTER AND SPRING FLOWERING SPECIES,

WITH YELLOW OR WHITE FLOWERS, THE LEAVES APPEARING WITH THE FLOWERS.

The first four of the following species are closely allied, and form a natural group. They have all finely divided capillary stigmata, oblong bright crimson seeds with a glabrous surface, and yellow flowers produced in the winter and early spring. In the first two, *C. vitellinus* and *C. Balansæ*, the stigmata are much branched and spreading In *C. Suterianus* and *C. Olivieri*, the individual stigmata are merely bifid, resulting in six stigmatic divisions, in which they resemble the stigmata of *C. candidus*.

50. CROCUS VITELLINUS.

Section: Nudiflori; parallelo-fibrosi *(Herbert)*: Schizostigma; vernal *(Baker)*.

Crocus vitellinus, Wahl. in Isis, vol. xvi, p. 101; Baker, Rev. Sp. Crocus in Gard. Chron., new ser., 1873, p. 680; List Crocus in Journ. R. Hort. Soc., new ser., vol. iv, 1877; and Syst. Iridac. in Journ. Linn. Soc., Bot., vol. xvi, p. 84; G. Maw in Gard. Chron., new ser., 1879, pp. 234-5; Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, p. 623; in The Garden, vol. xxi, p. 69; and Hist. Crocus in Journ. Linn. Soc., Bot., vol. xix, p. 373; Boiss., Fl. Orient., vol. v, part i, p. 106.

C. syriacus, Boiss. and Gaill. in Boiss. Diagn. Ser. 2, iv, p. 94; Tchihatcheff, Asie Min. part iii, Bot., vol. ii, p. 522; Baker, Rev. Sp. Crocus, in Gard. Chron., new ser., 1873, p. 680; List Crocus in Journ. R. Hort. Soc. Lond., new ser., vol. iv, 1877; and Syst. Iridac. in Journ. Linn. Soc., Bot., vol. xvi, p. 84.

C. lagenæflorus, var. *syriacus*, Herbert Hist. Crocus, sp. 34, var. 4, p. 36; from Journ. Hort. Soc. Lond., vol. ii, p. 282.

C. sulphureus, var. *a*, (not *C. sulphureus*, Griseb, which is *C. chrysanthus*, Herbert; not *C. sulphureus*, Ker, which is a garden form of *C. aureus*, Sibth. and Smith) Ker. Irid. Gen., p. 76.

C. graveolens, Boiss. et Reut., Boiss. Fl. Orient., vol. v, part i, p. 107.

Cormus $\frac{1}{2}$—$\frac{2}{3}$ poll. (0.013—0.017 metr.) altus, pyriformis; tunica membranacea basi fibroso-fimbriata. Vaginæ quam spatha breviores, scapos 2 vel plures involventes. Folia præfloralia ad florationem floribus æquantia, matura 10—12 poll. (0.250—0.300 metr.) longa, $\frac{1}{8}$—$\frac{1}{6}$ poll. (0.0032—0.0042 metr) lata, marginibus laminæ et carina parce ciliatis. Spatha diphylla. Perianthium: faux glabra; segmenta aurantiaca, rarius signis cupreis ornata, 1 poll. (0.025 metr.) longa, $\frac{1}{4}$—$\frac{1}{3}$ poll. (0.0063—0.0084 metr.) lata. Antheræ aurantiacæ vel flavæ, quam filamenta flava papillosa paullo breviores; stylus infra basis antherarum fissus, stigmata fasciculata patentia capillacea aurantiaca vel coccinea, antheras superantia.

Corm pyriform, from half an inch (0.013 metre) to three-quarters of an inch (0.019 metre) broad and high. *Tunic* membranous, splitting up into a fibre-like fringe at the base. *Basal Tunic* of short flat fibres, radiating from a coriaceous disc.

Sheathing Leaves about four, from half an inch to three inches (0.013—0.075 metre) high, falling short of the proper spathe, and enclosing several scapes.

Proper Leaves appearing before and with the flowers, and reaching to about the level of the flowers, produced at maturity to a length of ten or twelve inches (0.250—0.300 metre), one-eighth to one-sixth of an inch (0.0032—0.0042 metre) wide; the margins of the keel and of the blade ciliated; the keel one-third the width of the blade, the lateral channels wide and open, and without ridges.

Proper Spathe diphyllous, exceeding the sheathing leaves, from an inch and a half to two inches (0.038—0.050 metre) in length, the outer spathe tubular, the inner ligulate.

Perianth: Tube two inches in length (0.050 metre) from the ovary to the throat. *Throat* glabrous. *Segments* about an inch (0.025 metre) long, and from one-quarter to one-third of an inch (0.0063—0.0084 metre) broad, orange, the outer surface of the outer segments occasionally feathered with bronze markings.

Stamens from half an inch to three-quarters of an inch (0.013—0.019 metre) high; the yellow or orange *Anthers* shorter than the papillose orange *Filament*. *Pollen Grain* smaller than in any other species, $\frac{1}{750}$ of an inch (0.00003 metre) in diameter, pale yellow.

Pistil about three-quarters of an inch (0.019 metre) in height from the throat, exceeding the stamens; the *Style* dividing at the level of the base of the anthers, and produced into a spreading bunch of orange or scarlet capillary stigmata.

Scape about two inches (0.050 metre) in height at the flowering-time.

Capsule and *Seed* unknown.

Crocus vitellinus is a common species in northern Palestine, Syria, and the Cilician Taurus, ranging between $33\frac{1}{2}^{\circ}$ and 37° north latitude, and between $35\frac{1}{2}^{\circ}$ and 37° east longitude. It has been recorded from the following localities: near Saida, rocks near Jamalu; near Beyrout; the Lebanon; a deir el Kamar (Jisv el Kamar); Nebo Yunas, south Syria; calcareous pastures near Aleppo, and near Skanderûn (Iskanderûn, Alexandretta). It was gathered in the Taurus by Aucher-Eloy in 1837, and also by Mrs. Danford, on the Giour Dagh, Taurus. *C. vitellinus* flowers from the end of November into February, and varies with self-coloured orange flowers, (the form prevalent about Beyrout,) and flowers with the outside of the outer segments marked with bronze featherings, (the variety found at Aleppo and in the Taurus). The Beyrout plant has flowers occasionally feathered with bronze. The bronzed feathering of *Crocus syriacus*, (Boiss. and Gaill.) and of *C. graveolens* (Boiss.), is the only character that seems to separate them from *C. vitellinus;* and as nearly all the orange flowered Crocuses vary with bronze markings, I am unable to acknowledge the specific distinction on the mere ground of flower-colouring.

C. vitellinus flowers freely in cultivation; but is best grown to advantage under the shelter of a cold frame.

REFERENCES TO PLATE L.

Fig. 1. Flowering-state, February 28th, actual size.
Fig. 2. With matured leaves, July 21st.
Fig. 3. Diagrammatic dissection of scape, ovary, and spathes, actual size.
Figs. 4 & 5. Stamens and Pistil, magnified two-fold.
Fig. 6. Pollen Grain, magnified one hundred and fifty-fold.
Fig. 7. Section of leaf, magnified six-fold
Fig. 8. Corm tunic, magnified two-fold: *a*, cap; *b*, main tunic.

CROCUS VITELLINUS, *Wahl.*

C. syriacus, Boiss. & Blanche. *β. C. graveolens, Boiss.*

F. Huth, Lith. Reigate

Smyrna.

51. CROCUS BALANSÆ.

Section: Nudiflori; parallelo-fibrosi *(Herbert)*: Schizostigma; vernal *(Baker)*.

Crocus Balansæ, Gay; G. Maw in Gard. Chron., new ser., 1879, p. 234; Synops. Gen. Crocus in Gard. Chron., new ser., vol. xvi, p. 623; in The Garden, vol. xxi, num. 532, p. 69; and Hist. Crocus in Journ. Linn. Soc., Bot., vol. xix, p. 373; Boiss., Fl. Orient., vol. v, part i, p. 107.

C. vitellinus, var. *Balansæ*, Baker, Rev. Sp. Crocus in Gard. Chron., new ser., 1873, p. 680; and List Crocus in Journ. R. Hort. Soc. Lond., new ser., vol. iv, 1877.

C. syriacus, in part, Tchihatcheff, Asie Min., part iii, Bot., vol. ii, p. 522.

Cormus pyriformis, $\frac{3}{4}$ poll. (0.019 metr.) latus et altus. Tunica membranacea, basi in fibris planis fissa. Vaginæ quam spathæ breviores, scapos plures involventes. Folia synanthia, $\frac{3}{16}$ poll. (0.0047 metr.) lata, matura 10 poll. (0.250 metr.) longa, carina angustissima, canaliculis latis apertis, marginibus carinæ et laminæ ciliatis. Spatha diphylla, fauce vix æquans. Perianthium: faux glabra; segmenta aurantiaca, exteriora extus signis cupreis ornata, vel brunneo suffusa, 1—$1\frac{1}{4}$ poll. (0.025—0.032 metr.) longa, $\frac{1}{4}$—$\frac{1}{3}$ poll. (0.0063—0.0084 metr.) lata. Antheræ aurantiacæ, quam filamenta papillosa flava, paullo longiores. Stylus ad apices antherarum fissus, stigmata ramulosa patentia capillacea aurantiaca, antheras superantia. Capsula purpurea. Semina glabra, oblonga, splendide kermesina nitida.

Corm pyriform, about three-quarters of an inch (0.019 metre) broad and deep. *Tunic* membranous, splitting up at the base into flat fibre-like divisions.

Sheathing Leaves about three, from half an inch (0.013 metre) to two and a half inches (0.063 metre) in length, falling short of the proper spathes and enclosing several scapes.

Proper Leaves appearing before and with the flowers, and reaching above their level, produced at maturity to a length of about ten inches (0.250 metre), persistent till late in the summer, three-sixteenths of an inch (0.0047 metre) broad, ciliated on the margins of the keel and blade; the keel one-sixth the width of the blade, lateral channels wide and open.

Perianth: Tube from two to two and a half inches (0.050—0.063 metre) in length from the ovary to the throat. *Throat* glabrous. *Segments* from an inch to an inch and a quarter (0.025—0.032 metre) in length, and from one-quarter to a third of an inch (0.0063—0.0084 metre) in breadth, orange, the outer surface of the outer segments feathered with bronze, or evenly suffused with rich brown.

Stamens five-eighths of an inch (0.016 metre) high, shorter than the pistil; the orange *Anthers* a little longer than the papillose yellow *Filament*. *Pollen Grains* $\frac{1}{500}$ of an inch (0.00005 metre) in diameter, glabrous, orange.

Pistil nearly an inch (0.025 metre) high; the *Style* dividing at or below the level of the base of the anthers and produced into a spreading bunch of orange, or scarlet, capillary stigmata.

Scape about an inch and a half (0.038 metre) high at the flowering-time, produced to a height of two and a half inches (0.063 metre) at the maturity of the capsule.

Capsule about five-eighths of an inch (0.016 metre) long, and a quarter of an inch (0.0063 metre) broad, dark purple.

Seed oblong, one-fifth of an inch (0.0050 metre) long, and one-tenth of an inch (0.0025 metre) broad, with a polished surface, and bright crimson in colour.

Crocus Balansæ is nearly allied to *C. vitellinus*, but is distinctly vernal; instead of being a mid-winter flowering species. The foliage is remarkably persistent, remaining green till the end of July.

It is limited to western Asia Minor, and is abundant on the Hippurite Limestone plateau between Smyrna and the Taktali Dagh range, ascending to elevations of from two thousand to three thousand feet on the Taktali Dagh, Nymph Dagh, and Yamanlar Dagh; it has also been recorded from a point four kilos south-east of Koukoulondja, south-east of Smyrna, $38\frac{1}{2}^{\circ}$ north latitude, and 27° east longitude.

CROCUS BALANSÆ, *J. Gay.*

C. sativus var. *Balansæ*, *Baker.*

REFERENCES TO PLATE LI.

Fig. 1. Flowering-state, March 25th, actual size.
Fig. 2. With matured leaves and capsule, June 2nd, actual size.
Fig. 3. Diagrammatic dissection of scape, ovary, and spathes, actual size.
Fig. 4. Stamens and Pistil, magnified two-fold.
Fig. 5. Pollen Grain, magnified one hundred and fifty-fold.
Fig. 6. Stigmata, magnified six-fold.
Fig. 7. Section of leaf magnified six-fold.
Fig. 8. Seed, magnified six-fold.
Fig. 9. Corm tunic, magnified two-fold.

Mount Argæus (Arjish Dagh), from the west.
From a sketch by C. G. Danford, Esq.

52. CROCUS SUTERIANUS.

Section: Nudiflori; parallelo-fibrosi *(Herbert)*: Odontostigma?; vernal *(Baker)*.

Crocus Suterianus, Herbert in Bot. Reg. 1845, vol. xxxi, misc. 5; Hist. Crocus, sp. 35, p. 38; from Journ. Hort. Soc. Lond., vol. ii, p. 284; Tchihatcheff, Asie Min., part iii, Bot., vol. ii, p. 523; Baker, Rev. Sp. Crocus in Gard. Chron., new ser., 1873, p. 609; List Crocus in Journ. R. Hort. Soc. Lond., new ser., vol. iv, 1877; and Syst. Iridac. in Journ. Linn. Soc., Bot., vol. xvi, p. 83; G. Maw, Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, p. 623; in The Garden, vol. xxi, num. 532, p. 69; and Hist. Crocus in Journ. Linn. Soc., Bot., vol. xix, p. 373; Boiss., Fl. Orient., vol. v, part i, p. 108.

C. Aucheri, Boiss. Diag. ser. i, xiii, p. 16; Tchihatcheff, Asie Min., part iii, Bot., vol. ii, p. 522.

C. chrysanthus, Herbert in Bot. Reg. 1847, vol. xxxiii, tab. 4, fig. i. (not *C. Chrysanthus*, Herbert in Journ. Hort. Soc., ii, p. 285.)

Cormus pyriformis, $\frac{1}{2}$—$\frac{3}{4}$ poll. (0.013—0.019 metr.) latus et altus. Tunica membranacea, basi in fibris planis fissa. Vaginæ scapos plures involventes. Folia 3, atroviridia diutina, circiter $\frac{1}{6}$ poll. (0.0042 metr.) lata, carina et margines laminæ undique ciliata, carina angustissima. Spatha diphylla. Perianthium: faux glabra; segmenta 1—$1\frac{1}{4}$ poll. (0.025—0.032 metr.) longa, $\frac{1}{3}$ poll. (0.0084 metr.) lata, insigniter aurantiaca, extus versus basin fulva. Antheræ aurantiacæ, quam filamenta parce papillosa longiores; stylus versus basin antherarum fissus; stigmata circiter sex capillacea flava, quam apices antherarum breviora. Capsula purpurea. Semina oblonga, kermesina, glabra, matura chocolatina.

Corm pyriform, from half an inch to three-quarters of an inch (0.013—0.019 metre) broad and high. *Tunic* membranous, splitting up at the base into flat fibre-like divisions.

Sheathing Leaves about four, from half an inch to three inches (0.013—0.075 metre) in length, falling short of the proper spathes, and enclosing three or four scapes.

Proper Leaves about three, appearing with, and reaching to, the level of the flowers; produced at maturity to a length of ten inches (0.250 metre), three-sixteenths of an inch (0.0047 metre) broad; the entire surface of the keel and the margins of the blade ciliated; the keel one-sixth the width of the blade, the lateral channels wide and open.

Proper Spathe diphyllous, two inches (0.050 metre) in length, exceeding the sheathing leaves; the outer spathe tubular, the inner ligulate.

Perianth: Tube three inches (0.075 metre) in length from the ovary to the throat. *Throat* unbearded. *Segments* from an inch to an inch and a quarter (0.025—0.032 metre) long, and one-third of an inch (0.0084 metre) broad, bright orange, fulvous towards the throat.

Stamens five-eighths of an inch (0.016 metre) high, much exceeding the pistil; the orange *Anthers* longer than the slightly papillose orange *Filament*. *Pollen Grain* $\frac{1}{450}$ of an inch (0.00006 metre) in diameter, yellow, with a corrugated surface.

Pistil barely three-eighths of an inch (0.010 metre) high; the *Style* dividing towards the base of the anthers and shortly produced into about six divisions of the capillary, yellow stigmata, which barely reach to the level of the middle of the anthers.

Scape about an inch and a half (0.038 metre) high at the flowering-time, produced to a height of two inches (0.050 metre) at the maturity of the capsule.

Capsule three-quarters of an inch (0.019 metre) long, and one-quarter of an inch (0.0063 metre) broad, purple.

Seed oblong, one-fifth of an inch (0.0050 metre) long, and one-tenth of an inch (0.0025 metre) broad, with a glabrous surface, bright crimson, ripening to a rich chocolate colour.

Crocus Suterianus from the central parts of Asia Minor, is closely allied to the Greek *C. Olivieri*, but is readily distinguished by its much narrower leaves, and

CROCUS SUTERIANUS, *Herbert.*

J. Mew del

F. Huth, Lith^r Edin^r

its corm tunic. It appears to be limited to central Asia Minor, between latitude $38\frac{1}{2}°$ and $41\frac{1}{2}°$ north, and longitude $31\frac{1}{2}°$ and $35\frac{1}{2}°$ east. It has been collected in the mountains of Nicæa near Angora, Sivrihassar (Sivrihissar), and Boli; and on the slopes of the Arjish Dagh, (Mount Argæus,) near Kaisarieh in Cappadocia. Herbert's record of its occurrence in the mountains of Nauplia appears to have been an error. Originally it was discovered by Mr. Henry Suter, British V.-Consul in Caramania, on the slopes of Mount Argæus. I am indebted to the late Mr. Gavan Gatheral, Her Majesty's Vice-Consul at Angora, for a liberal supply of the roots collected near Angora and Sivrihassar, and also to Mrs. Danford for roots and specimens from the same district. *C. Suterianus* flowers and seeds freely in cultivation. The flowers, of which there are several to a corm, are produced from the end of January to the beginning of March.

REFERENCES TO PLATE LII.

Fig. 1. Flowering-state, January 16th, actual size.
Fig. 2. With matured leaves and capsule, May 16th, actual size.
Fig. 3. Diagrammatic dissection of scape, ovary, and spathes, actual size.
Fig. 4. Stamens and Pistil, magnified two-fold.
Fig. 5. Pollen Grain, magnified one hundred and fifty-fold.
Fig. 6. Stigmata, magnified six-fold.
Fig. 7. Filament, magnified twelve-fold.
Fig. 8. Section of leaf, magnified six-fold.
Fig. 9. Seed, June 7th, magnified six-fold.
Fig. 10. Corm tunics, magnified two-fold: *a*, cap; *b*, main tunic.

53. CROCUS OLIVIERI.

Section: Nudiflori; parallelo-fibrosi *(Herbert)*: Odontostigmatæ; vernal *(Baker)*.

Crocus Olivieri, Gay in Féruss. Bull. Sc. Nat., vol. xxv, p. 319 (219); and drawing Bibl. J. D. Hooker; Körnicke in Flora 1856, p. 470; Tchihatcheff, Asie Min., part iii, Bot., vol. ii, p. 522; J. D. Hooker in Bot. Mag. 1873, tab. 6031; Baker, Rev. Sp. Crocus in Gard. Chron., new ser., 1873, p. 609; List Crocus in Journ. R. Hort. Soc. Lond., new ser., vol. iv, 1877; and Syst. Iridac. in Journ. Linn. Soc., Bot., vol. xvi, p. 83; G. Maw, Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, p. 718; in The Garden, vol. xxi, num. 532, p. 69; and Hist. Crocus in Journ. Linn. Soc., Bot., vol. xix, p. 373; Boiss., Fl. Orient., vol. v, part i, p. 107.

C. lagenæflorus, var. *Olivierianus*, Herbert, Hist. Crocus, sp. 34, var. 6, p. 35-36; from Journ. Hort. Soc. Lond., vol. ii, p. 281-282.

? *C. Aucheri*, Boiss. Diag. ser. i, xiii, p. 16.

C. sulphureus, (not *C. sulphureus*, Griseb., which is *C. chrysanthus*, Herbert; not *C. sulphureus*, Ker, which is a garden form of *C. aureus*, Sibth. and Smith), Klatt, Revis. Irid. in Linnæa, vol. xxxiv, p. 676-7.

Cormus $\frac{1}{2}$—$\frac{3}{4}$ poll. (0.013—0.019 metr.) latus, $\frac{1}{2}$ poll. (0.013 metr.) altus, ferme sphæricus. Tunica membranacea, fibris angustis planis parallelis; tunica basalis fibris planis radiatis confecta. Vaginæ quam spatha breviores, 1—2 scapos involventes. Folia floribus æquantia, $\frac{1}{3}$ poll. (0.0084 metr.) lata, carina angustissima, marginibus laminæ ciliatis. Spatha diphylla, fauce æquans. Perianthium: faux glabra; segmenta aurantiaca, obtusa, 1—$1\frac{1}{4}$ poll. (0.025—0.032 metr.) longa et $\frac{1}{3}$ poll (0.0084 metr.) lata. Antheræ aurantiacæ quam filamenta aurantiaca papillosa bis longiores. Stylus apud faucem fissus; stigmata circiter sex capillacea flava antheras vix superantia.

Corm from half an inch to three-quarters of an inch (0.013—0.019 metre) broad and high, nearly spherical. *Tunic* membranous; fibro-membranous towards the base. *Basal Tunic* of flat radiating fibres.

Sheathing Leaves about four, from half an inch to three and a half inches (0.013—0.088 metre) in length, falling short of the proper spathes and enclosing several scapes.

Proper Leaves three or four, appearing with the flowers and reaching to the level of the flowers at the flowering-time, produced at maturity to about a foot (0.300 metre) in length, exceptionally broad, one-third of an inch (0.0084 metre) wide, the keel one-eighth the width of the blade, the lateral channels wide and open, the margins of the keel and blade ciliated.

Proper Spathe diphyllous, about an inch and a half (0.038 metre) in length, reaching to the throat.

Perianth: Tube from an inch and a half to two inches (0.038—0.050 metre) in length from the ovary to the throat. *Throat* glabrous. *Segments* obtuse, from an inch to an inch and a quarter (0.025—0.032 metre) long, and about a third of an inch (0.0084 metre) broad, bright orange.

Stamens barely half an inch (0.013 metre) high; the orange *Anthers* about twice the length of the papillose orange *Filament*. *Pollen Grain* $\frac{1}{600}$ of an inch (0.00004 metre) in diameter, yellow, with a corrugated surface.

Pistil shorter than the stamens; the *Style* dividing a little above the throat, and produced into six equal capillary divisions of the yellow stigmata, each stigma being bifid.

Scape at the flowering-time about two inches (0.050 metre) in height.

Capsule and *Seed* unknown.

Crocus Olivieri is a native of Greece, the Cyclades, Roumelia, and Rumania, occurring between latitude $37\frac{1}{2}^{\circ}$ and 45° north, and longitude $22\frac{1}{2}^{\circ}$ and $27\frac{1}{2}^{\circ}$ east, and ranging in altitude from one thousand up to five thousand feet.

There is a question as to the synonomy of this species, which also leaves the individual records of habitats open to doubt. Baker does not hesitate to identify Boissier's *C. Aucheri*, with Gay's *C. Olivieri;* and tells me that *C. Aucheri* was founded on Aucher-Eloy's specimen No. 5349 from Guenivè, in Asia Minor, and identical with Gay's type specimen of *C. Olivieri* from Scio; and he also identifies it with specimens from Argolis, collected by Spruner. I understand Monsieur Boissier considered that the broad-leaved *C. Olivieri*, of Gay, is limited to Europe; and that the narrow-leaved allied species from Asia Minor, described by Herbert as *C. suterianus*, is his *C. Aucheri.*

I think it is clear that there are but two species referred to under the three names of *Olivieri*, *Aucheri*, and *Suterianus*, and I prefer for the present to leave the question of synonomy *sub judice.* Nevertheless I have no hesitation in viewing the plant I have in cultivation from several localities in Asia Minor, as distinct from the broad-leaved Greek species grown in English gardens, under the names of *C. Olivieri* and *C. Aucheri.*

C. Olivieri has been recorded from between Tegea and Karya (Krya), and from Argolis in the Morea, the Island of Chio (Scio, Khios); from Mount Parnes (Parnethos, Ozea) north of Athens, up to an altitude of four thousand feet; Mount Parnassus (Liakouri, Liakoura); Rhodosto in Roumelia; the environs of Bukharest, and the woods of Rumania; also from Belu, near Adalia, in Lycia; but the latter is open to doubt. Herbert places this species as a variety of his *C. lagenæflorus*, (*C. aureus*, Sibth. and Smith;) but the character of its pistil, as well as its lesser stature, readily distinguishes it.

Its flowers are produced with the leaves in the early spring. It has been sparingly in cultivation for many years: and is a species well suited for the decoration of the spring garden.

CROCUS OLIVIERI, *Gay.*

β C. Aucheri, Boiss. *C. lagenæflorus var. Olivierianus, Herbert.*

G. Maw del.

F. Huth, Lith^r Edin^r

REFERENCES TO PLATE LIII.

Fig. 1. Flowering-state, March 24th, actual size.
Fig. 2. With matured leaves, May 2nd, actual size.
Fig. 3. Diagrammatic dissection of scape, ovary, and spathes, actual size.
Fig. 4. Stamens and Pistil, magnified two-fold.
Fig. 5. Pollen Grain, magnified one hundred and fifty-fold.
Fig. 6. Stigmata, magnified six-fold.
Fig. 7. Section of leaf, magnified six-fold.
Fig. 8. Corm tunics, magnified two-fold: *a*, main tunic; *b*, basal tunic.

54. CROCUS CANDIDUS.

Section: Nudiflori; parallelo-fibrosi *(Herbert)*: Schizostigma; vernal *(Baker)*.

Crocus candidus, Clarke, Clarke's Travels, 1812, vol. ii, p. 145; G. Maw, Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, p. 718; in The Garden, vol. xxi, num. 532, p. 69; and Hist. Crocus in Journ. Linn. Soc., Bot., vol. xix, p. 373; Boiss., Fl. Orient., vol. v, part i, p. 106.

C. lagenæflorus, var. *candidus*, Herbert, Hist. Crocus, sp. 34, var. 9, p. 35-36; from Journ. Hort. Soc. Lond., vol. ii, p. 282.

C. Fleischeri (not *C. Fleischeri*, Gay), Boiss. Diag. ser. 1, xiii, p. 16-17; Baker Rev. Sp. Crocus in Gard. Chron., new ser., 1873, p. 680; List Crocus in Journ. R. Hort. Soc. Lond., new ser., vol. iv, 1877; and Syst. Iridac. in Journ. Linn. Soc., Bot., vol. xvi, p. 84.

C. Kirkii, G. Maw in Gard. Chron., new ser., 1879, p. 234.

Cormus globosus, $\frac{2}{3}$—$\frac{3}{4}$ poll. (0.017—0.019 metr.) latus, $\frac{2}{3}$ poll. (0.017 metr.) altus. Tunica, illi *C. aurei* similis, membranacea, fibris angustis verticalibus fasciculatis, 3-4 in fasciculo apice connatis; tunica basalis radiis fibrosis planis confecta. Vaginæ quam spathæ breviores, scapos plures involventes. Folia synanthia et tunc floribus æquantia, matura 18—20 poll (0.450—0.500 metr.) longa, $\frac{1}{4}$ poll. (0.0063 metr.) lata, carina angustissima, marginibus carinæ et laminæ ciliatis. Spatha diphylla, fauce ferme æquans. Perianthium: faux glabra aurantiaca; segmenta 1—$1\frac{1}{4}$ poll. (0.025—0.032 metr.) longa, alba, versus basin flavescentia, exteriora extus purpureo suffusa, vel signis purpureis ornata. Antheræ aurantiacæ, filamentis flavis æquales. Stylus ad basin antherarum fissus, stigmata 12 capillacea aurantiaca, antheris æquantia.

Corm from two-thirds of an inch (0.017 metre) to three-quarters of an inch (0.019 metre) broad and high *Tunic* a strong membrane, splitting upwards into narrow fibroid divisions, which are united at the apex into parcels of three or four; the *Basal Tunic* a membranous disc surrounded by fibroid flat rays.

Sheathing Leaves three or four, from an inch to four inches (0.025—0.100 metre) in length, falling short of the proper spathes and enclosing two or three scapes.

Proper Leaves three or four, dark green, reaching to the throat at the flowering-time and produced at maturity to a length of twenty to twenty-two inches (0.500—0.550 metre), nearly one quarter of an inch (0.0063 metre) wide, the keel one-sixth the width of the blade, the lateral channels wide and open, the margins of the keel and the blade ciliated.

Proper Spathe diphyllous, two and a half inches (0.063 metre) in length, exceeding the sheathing leaves, and reaching to the throat; the inner spathe ligulate, the outer tubular.

Perianth: Tube from two to two and a half inches (0.050—0.063 metre) in length from the ovary to the throat. *Throat* unbearded, orange. *Segments* from an inch to an inch and a quarter (0.025—0.032 metre) long, and from a quarter to a third of an inch (0.0063—0.0084 metre) broad, white; the outer surface of the outer segments either self-coloured white, or suffused or feathered with purple.

Stamens from half an inch to five-eighths of an inch (0.013—0.016 metre) high, reaching to the level of the stigmata; the orange *Anthers* a little longer than the orange *Filament*. *Pollen Grains* $\frac{1}{500}$ of an inch (0.00005 metre) in diameter, channelled with sinuous depressions.

Pistil from half an inch to five-eighths of an inch (0.013—0.016 metre) high from the throat; the *Style* dividing at the level of the base of the anthers and produced into about a dozen capillary divisions of the orange stigmata, which reach nearly to the level of the summit of the anthers.

Scape about an inch and a quarter (0.032 metre) high at the flowering-time, and produced in April to a height of four or five inches (0.100—0.125 metre).

Capsule purple, three-quarters of an inch (0.019 metre) high, and one-third of an inch (0.084 metre) broad.

Seed bright crimson, glabrous, oblong, one-fifth of an inch (0.005 metre) high, and one-tenth of an inch (0.0025 metre) broad with a prominent caruncle of the same colour as the body of the seed.

The history of this species is somewhat remarkable. It is a native of The Troad, 26½° east longitude, and 39½° north latitude, and was discovered there by Dr. E. D. Clarke, the English traveller, in the spring of 1806, on the flanks of Mount Gargarus, (Kaz Dagh,) one of the heights of Mount Ida. Clarke's specimens however had been lost sight of for more than half a century; and in their absence Monsieur Boissier assumed the identity of Clarke's *C. candidus* with *C. Fleischeri* of Gay.

In the autumn of 1879, I had the good fortune to find them without a name, and merely labelled "Troas" by Dr. Clarke, in the Webb Herbarium at Florence, —unquestionably the plant described in a foot note at p. 145, vol. 2, of his Travels. By a curious coincidence, in the spring of the same year I met with specimens in the Herbarium of the Edinburgh Botanic Gardens, collected by Dr. Kirk in March and April, 1856, at Renkioi, near the Dardanelles, from the Limestone Hills about two miles inland Dr. Kirk tells me. These were also without name, and believing at the time they belonged to a new species, I described them in the *Gardeners' Chronicle* as *C. Kirki*, a subsequent comparison with the Florence specimens however identified them beyond doubt with Clarke's *C. candidus*.

The corm tunic, leaf structure, and spathes point to its affinity with *C. aureus*, but the fine capillary stigmata, and flower-colouring clearly separate it as a distinct species; and I must dissent from Herbert's view of its being merely a variety of *C. lagenæflorus* of Salisbury (*C. aureus*, Sibth. and Smith.) I am indebted to Mr. Maling, Her Majesty's Vice-Consul at the Dardanelles, for having sent several expeditions to Renkioi in search of it, though without result. I have received from Herr Ascherson, of the Royal Botanical Museum, Berlin, specimens of a Crocus in

CROCUS CANDIDUS, *Clarke.*

C. lagenæflorus var. candidus, Herbert. C. Kirkii, G. Maw.

J. Maw del.

F. Huth, Lith. Edin.

fruit, which appears to be this species, gathered at Thymbra in the valley of the Scamander. Monsieur P. Sintenis, of Bolkenhain, Silesia, collected *C. candidus* in The Troad, in 1883, and transmitted some corms to Herr Max Leichtlin, of Baden Baden, through whom I received two which flowered at Benthall early in March, 1885. Herr Max Leichtlin has also flowered it at Baden; and I have also received from Dr. Urban a specimen flowered in the Berlin Botanic Garden.

REFERENCES TO PLATE LIV.

Fig. 1. Flowering-state, March, actual size: *a*, Clarke's specimen from Mount Gargarus; *b*, from Renkioi, collected by Dr. Kirk.
Fig. 2. With matured leaves, April, actual size, Renkioi, collected by Dr. Kirk.
Fig. 3. Stigmata, magnified six-fold.
Fig. 4. Stamens and Pistil, magnified two-fold.
Fig. 5. Diagrammatic dissection of scape, ovary, and spathes, actual size.
Fig. 6. Section of leaf, magnified six-fold.
Fig. 7. Corm tunic, magnified two-fold: *c*, cap; *d*, main tunic; *e*, basal tunic.

55. CROCUS AUREUS.

Section: Nudiflori; parallelo-fibrosi *(Herbert)*: Holostigma; vernal *(Baker)*.

Crocus aureus, Sibth. & Smith, Prod. Fl. Græca, vol. i, p. 24; Fl. Græca, p. 25, tab. 35; Eng. Bot, Ed. 2, Suppl. tab. 2646; and Ed. 3, tab. 1498; Bot. Mag. 1830, tab. 2986; Rchb. Ic. Crit., vol. x. tab. 925, fig. 1246; and Ic. Germ., vol. ix, tab. ccclvii; Herbert, two drawings in Lindl. Libr., R. Hort. Soc. Lond.; Klatt, Revis. Irid. in Linnæa, vol. xxxiv, p. 678-719; G. Maw, Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, p. 718; in The Garden, vol. xxi, num. 532, p. 69; and Hist. Crocus in Journ. Linn. Soc., Bot., vol. xix, p. 373; Boiss., Fl. Orient., vol. v, part i, p. 108.

C. vernus, (not *C. vernus* Allione), Curtis, Bot. Mag., vol. i, tab. 45.

C. lagenæflorus, var. 3, Salisb., Parad, Lond., tab. 106; and drawing Bibl. Bot. Br. Museum.

C. lagenæflorus, Haworth in Trans. Hort. Soc. Lond., vol. i, p. 134; Sabine in Trans. Hort. Soc. Lond., vol. vii, p. 144, tab. 11, fig. 2; Gay, drawing Bibl. J. D. Hooker; Herbert, Hist Crocus sp. 34, p. 35; from Journ. Hort. Soc. Lond., vol. ii, p. 282; including var. 1, *aureus*; sub var. 1, *trilineatus;* var. 2, *striatus;* and var. 5, *luteus.*

C. floribundus, Haworth in Trans. Hort. Soc. Lond., vol. i, p. 133.

C. luteus, Lam., Encyc. vi, 385; Red., Lil., tab. 196; Hayne, Arzneigewächse, vi, 27; Bouché Gattung Crocus in Linnæa, vol. i, p. 233, Nees, Gen. Plant. Fl. Germ. 3, x; Gay, drawing Bibl. J. D. Hooker; Rchb. Ic. Crit., vol. x, tab. 926, fig. 1247; Ic. Germ., vol. ix, tab. ccclvii, fig. 792-793; Sturm, Deutsch. Fl., vii, tab. 27.

C. mœsiacus, Ker. Irid. Gen. 1827, p. 72; Gay, drawing Bibl. J. D. Hooker; Heuffel in Verh. Zoolog.-Bot. Gesell. 1835, p. 206; ? Tchihatcheff, Asie Min. part iii, Bot., vol. ii, p. 521; Baker, Rev. Sp. Crocus in Gard. Chron., new ser., 1873, p. 291; List Crocus in Journ. R. Hort. Soc. Lond., new ser., vol. iv, 1877; and Syst. Iridac. in Journ. Linn. Soc., Bot., vol. xvi, p. 80, including also var. *aureus.*

Var. 1. *sulphureus*, (not *C. sulphureus* of Grisebach and of Tchihatcheff, which is *C. chrysanthus*, Herbert; not *C. sulphureus*, var. *a*, Ker, which is *C. vitellinus*, Wahl.); *C. sulphureus concolor*, Ker in Bot. Mag., tab. 1384; Bouché Gattung Crocus in Linnæa, vol. i, p. 233; Sabine in Trans. Hort. Soc. Lond., vol. vii, p. 438, tab. xi, fig. 1; Rchb. Ic. Crit. tab. 927; Gay, drawing Bibl. J. D. Hooker; Baker, Rev. Sp. Crocus in Gard. Chron., new ser., 1873, p. 291; List Crocus in Journ. R. Hort. Soc. Lond., vol. iv, new ser., 1877; and Syst. Iridac. in Journ. Linn. Soc., Bot., vol. xvi, p. 80; G. Maw, Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, p. 718; in The Garden, vol. xxi, num. 532, p. 69.

C. flavus, Haworth in Trans. Hort. Soc. Lond., vol. i, p. 135.

Var. 2. *sulphureus pallidus*, Tourn. Inst. 352, Miller Dict. ed. 7; G. Maw, Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, p. 718; in The Garden, vol. xxi, num. 532, p. 69.

C. vernus latifolius flavo flore minore et pallidiore, Bauhin, Phytopinax, 66, anno 1596.

Var. 3. *sulphureus striatus*, Ker in Bot. Mag. 1806, tab. 928; Gay, drawing Bibl. J. D. Hooker; G. Maw Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, p. 718; in The Garden vol. xxi, num. 532, p. 69.

C. vernus flavus striatus, Park., Parad. 163, fig. 10.

Var. 4. *lacteus* (not *C. lacteus*, Gay, drawing Bibl. J. D. Hooker, which is a variety of *C. vernus*), *C. lacteus concolor*, Sabine in Trans. Hort. Soc. Lond., vol. v, p. 7; *C. lacteus*, Sabine in Trans. Hort. Soc. Lond., vol. vii, p. 447; Sweet, Br. Fl. Gard. ii, tab. 194.

C. aureus, var. *lacteus*, G. Maw, Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, p. 718; in The Garden, vol. xxi, num. 532, p. 69.

C. lagenæflorus, vars. 1 and 2, Salisb. Parad., Lond. sub tab. 106; and vars. 2 and 3, Haworth in Trans. Hort. Soc. Lond., vol. i, p. 134.

C. lagenæflorus, var. 1, *aureus*, sub-vars. 4. *lacteus* and 6. *lutescens*, Herbert Hist. Crocus sp. 34, p. 35—36; from Journ. Hort. Soc. Lond., vol. ii, p. 282. *C. lagenæflorus* var. *lacteus lutescens*, Herbert in Bot. Mag., tab. 3869; and two drawings in Lindl. Libr. R. Hort. Soc. Lond.

C. mœsiacus, var. β. Ker in Bot. Mag. anno 1808, tab. 1111.

C. mœsiacus, var. 4. *lacteus*, Baker, Rev. Sp. Crocus in Gard. Chron., new ser., 1873, p. 291; List Crocus in Journ. R. Hort. Soc., new ser., vol. iv, 1877; and Syst. Iridac. in Journ. Linn. Soc., Bot., vol. xvi, p. 80.

Sub-var. 1, *C. lacteus penicillatus*, Sabine in Trans. Hort. Soc. Lond., vol. vi, p. 447, tab. ii, fig. 3. *C. lagenæflorus* var. *a*, Salisb. in Bot. Mag. tab. 2655.

C. lagenæflorus, var. *lacteus penicillatus*, sp. 35, sub-var. 5, p. 36, Herbert Hist. Crocus; from Journ. Hort. Soc. Lond., vol. ii, p. 282; and drawing Lindl. Libr. R. Hort. Soc. Lond.

Sabine, in addition to the above, enumerates three other varieties—*striatellus*, *isabellinus*, and *albidus*, which are difficult of identification.

Cormus oblatus, poll. (0.025 metr.) latus, $\frac{3}{4}$ poll. (0.019 metr.) altus. Tunica membranacea, fibris verticalibus angustis a basi superne fissis. Vaginæ scapos plures involventes, quam spatha breviores. Folia synanthia matura pedalia (0.300 metr.), $\frac{1}{6}$ poll. (0.0042 metr.) lata, carina angustissima marginibus ciliatis. Spatha sæpius diphylla fauce ferme æquans, valvula una tubulosa, altera angustissima ligulata (hæc nonnunquam deest). Perianthium splendide aurantiacum, faux glabra; segmenta ferme $1\frac{1}{2}$ poll. (0.038 metr.) longa, $\frac{1}{2}$ poll. (0.013 metr.) lata, segmenta exteriora rarius lineis griseis paucis versus basin ornata, quam interiora paullo longiora. Antheræ hastatæ, sursum acuminatæ, apicibus divergentibus. Filamenta flava papillosa dimidio antherarum æquantia. Stylus flavus, in medio antherarum fissus; stigmata flava, rarius aurantiaca, obscure fissa, quam antheræ (in forma typica) breviora. Capsula spatha marcescente involuta. Semina kermesina, polita, hirsuta; chalaza, raphe, et caruncula prominulis, pallide roseis, marginibus hirsutis.

Corm about three-quarters of an inch (0.019 metre) broad and high in the wild plant, and much larger in the cultivated forms. *Tunic* membranous, with narrow fibroid divisions splitting up from the base; the *Cap* produced upwards to a height of two or three inches (0.050—0.075 metre), with the remainder of the previous year's sheathing leaves. The *Basal Tunic* of radiating flat fibres.

Sheathing Leaves four or five, from three-quarters of an inch to three and a half inches (0.019—0.088 metre) long, shorter than the proper spathes, and containing three or four scapes.

Proper Leaves about six, reaching to the throat at the flowering-time, and produced to a height of twelve or fourteen inches (0.300—0.350 metre) at the maturity of the capsule, one-sixth of an inch (0.0042 metre) wide, the keel about one-seventh the width of the blade, the lateral channels wide and open, margins of blade slightly ciliated.

Proper Spathe diphyllous, three inches (0.075 metre) in length, exceeding the sheathing leaves, and reaching nearly to the throat; the inner spathe ligulate, and the outer tubular.

Perianth: Tube from three and a half to four inches (0.088—0.100 metre) in length from the ovary to the throat. *Throat* unbearded, orange. *Segments* about an inch and a half (0.038 metre) long, and half an inch (0.013 metre) broad; bright orange, the outer surface of the outer segments occasionally marked with a few grey lines towards the base.

Stamens about three-quarters of an inch (0.019 metre) high, much exceeding the pistil. The divergent hastate orange *Anthers* about twice as long as the orange *Filament*. *Pollen Grains* $\frac{1}{360}$ of an inch (0.00007 metre) in diameter, orange, the surface channelled with sinuous lines.

CROCUS AUREUS, *Sibthorpe and Smith.*

C. masiacus, Ker. *C. lagenæflorus, Herbert, Sabine and Haworth.*

G Maw del.

P Huth Lith^r Edin^r

Pistil shorter than the stamens, from three-eighths to five-eighths of an inch (0.010—0.016 metre) in height from the throat; the *Style* dividing at the level of the middle of the anthers, and shortly produced into sub-entire, yellow or orange stigmata.

Scape barely an inch (0.025 metre) high at the flowering-time, and produced to a height of two or three inches (0.050—0.075 metre) at the maturity of the capsule.

Capsule fully an inch (0.025 metre) high, and half an inch (0.013 metre) broad, closely invested with the remains of the proper spathes.

Seed one-fifth of an inch (0.0050 metre) high, and one-eighth of an inch (0.0032 metre) broad, bright rose-colour ripening to brown; the prominent chalaza, raphe, and caruncle pale flesh-colour, and ciliated.

The description of the wild typical *Crocus aureus*, represented in Plate LV, will apply for the most part to the old horticultural varieties represented in Plate LV*b*, except as regards the stamens, which are effete and much reduced in size, and the flower-colouring, which ranges from nearly pure white or cream-colour through shades of yellow to orange, either self-coloured or feathered and veined externally with grey or chocolate markings. These varieties do not produce seed.

C. aureus is said to have been introduced by Clusius from the Levant in 1579; but it was probably a much earlier introduction; as it was certainly known to Gerard as a garden plant before 1597, and probably to Turner as early as 1548. The strong evidence in favour of its having been known in gardens long before the time of Clusius, is the fact that the ancient herbaria consolidated in the Herbarium Sloaneanum at the British Museum contain examples of nearly every variety of *C. aureus* we now possess; and as none of these are known as wild plants, they imply a far back cultivation of *C. aureus*, of which they are evidently the offspring. The most familiar of these varieties is the Dutch yellow Crocus, Plate LV*b*, fig. 1. It differs little from the wild plant, except in its more robust habit, the invariable presence of external grey lines on the outer surface of the segments, and that it never bears seed, though effete capsules are occasionally produced. The most extreme departure from the type is found in var. *lacteus*, in which the flower is nearly white, and between this and the Dutch yellow there are many intermediate varieties.

Crocus aureus extends further west than any other orange species, ranging from Servia on the west, to the Dobrudscha and western Asia Minor to the east, between longitude 21° and 30° east; and from the Island of Scio on the south, to the Southern Banat, from 38½° to 45° north latitude. It is uncertain whether it occurs at all in Greece, where *C. Olivieri* seems to take its place.

There is a specimen in the De Candolle Herbarium at Geneva from the Island of Scio. In Asiatic Turkey Dr. Kirk gathered it at Renkioi (Erenkoi) near the

Dardanelles. In 1877 I found it abundantly on the flanks of Olympus, above the baths at Broussa at an altitude of nine hundred feet, and also at an altitude of four hundred feet between Broussa and Gemlik (Gumehlik); but I can find no records of its having been found much farther east in Asia Minor. On the European side of the Bosphorus, Mr. Millengen gathered it near the sources of the Ayas-Agha or Kiahathane river, a tributary of the Sweet Waters. It occurs also near Rodosto, in Roumelia; near Adrianople; at Rhodopa (Rhodope Dagh?); and at Slivno, in the Balkans; also near Babadagh in the Dobrudscha, its most north-eastern limit. It has been recorded from Krajova (Crajova), in Wallachia, and Mount Grben in Servia, its most western limit. It reaches its most northern range in Transylvania, where it occurs on Mount Arasule, and Straschutz (Strasatz) mountain near Mehadia, at Swinitza, likewise Schwarzoll in the Banat, and at Schwernsdorf.

It has been naturalized near Montreaux in Switzerland, and in Barton Park, Suffolk.

Crocus aureus occurs generally at low elevations, and the flowers are produced in February and March.

REFERENCES TO PLATE LV.

Fig. 1. Flowering-state, March 21st, cultivated from wild roots from the foot of Mount Olympus, near Broussa, actual size; *a*, *b*, *c*, outer surface of segments.
Fig. 2. With matured leaves and capsule, May 30th, actual size.
Fig. 3. Diagrammatic dissection of scape, ovary, and spathes, actual size.
Fig. 4. Stigmata, magnified six-fold.
Fig. 5. Stigmata of a cultivated specimen from Transylvania, magnified two-fold.
Figs. 6 & 7. Stamens and Pistil of a cultivated specimen from Broussa, magnified two-fold.
Fig. 8. Pollen Grain, magnified one hundred and fifty-fold.
Fig. 9. Section of leaf, magnified six-fold.
Fig. 10. Capsule, actual size.
Fig. 11. Seed, magnified six-fold.
Fig. 12. Corm tunics, magnified two-fold: *d*, cap; *e*, main tunic; *f*, basal tunic.

REFERENCES TO PLATE LV*b*.

Fig. 1*a*. "*C. mæsiacus*" or Dutch yellow Crocus, a horticultural variety of *C. aureus*, March 17th, actual size.
Fig. 1*b*. Section of leaf, magnified six-fold.
Fig. 1*c*. Pollen Grain, magnified one hundred and fifty-fold: *d*, stamens and pistil, magnified two-fold.
Fig. 2*a*. Flower of the cultivated form of *C. aureus*, actual size: *b*, Pollen Grain, magnified one hundred and fifty-fold; *c*, Stamens and Pistil, magnified two-fold.
Fig. 3*a*. Flower of var. *lacteus*, actual size: *b*, pollen grain, magnified one hundred and fifty-fold; *c*, section of leaf, magnified six-fold; *d*, Stamens and Pistil, magnified two-fold.
Fig. 4. Flower of var. *lacteus penicillatus*, actual size.
Fig. 5*a*. Flower of var. *sulphureus concolor*, actual size: *b*, section of leaf, magnified six-fold; *c*, Stamens and Pistil, magnified two-fold.
Fig. 6*a*. Flower of var. *sulphureus striatus*, April 3rd, actual size: *b*, Stamens and Pistil, magnified two-fold.
Fig. 7*a*. Flower of var. *sulphureus pallidus*, April 13th, actual size: *b*, Stamens and Pistil, magnified two-fold.

Fig. 5. C sulphureus concolor. *Ker.*

Fig. 1. a "C. mœsiacus" or "Dutch yellow". March 17th

Fig. 2. Crocus aureus.

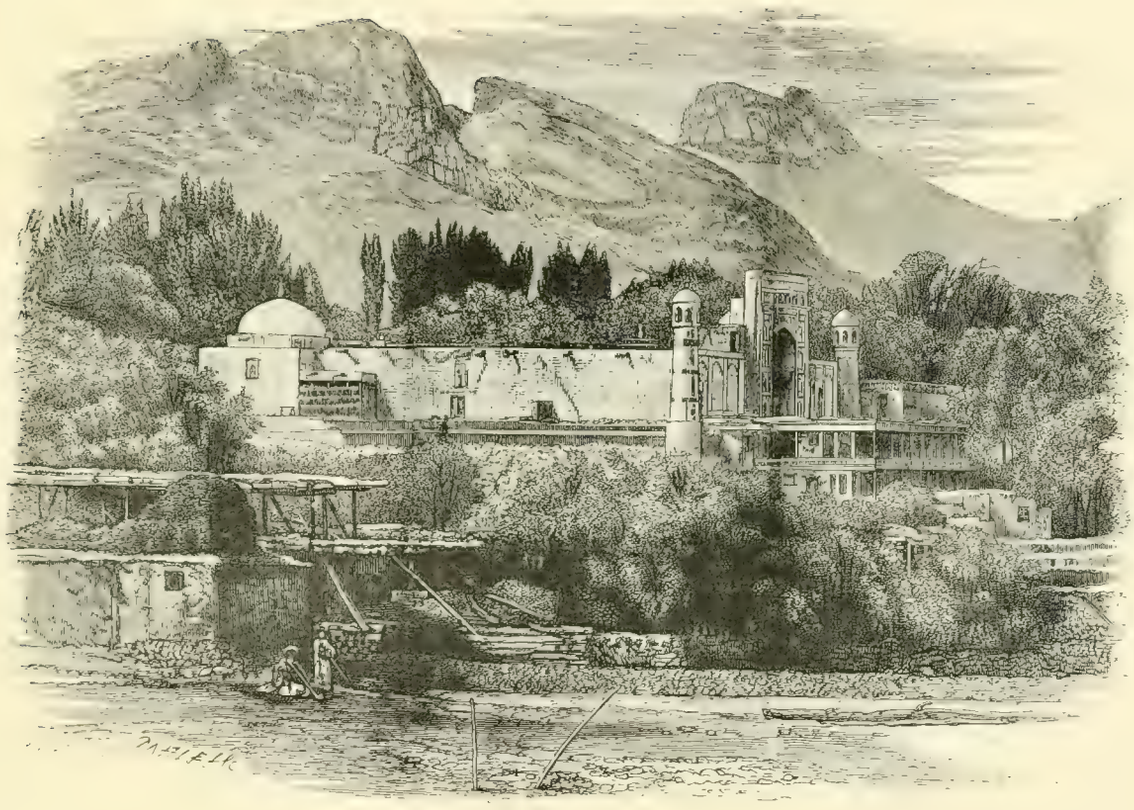
Fig. 6. C. sulphureus striatus. *Ker.* April 3rd

Fig. 7. C. sulphureus pallidus. April 13th

OLD HORTICULTURAL FORMS OF CROCUS AUREUS, *Sibthorpe and Smith.*

G Maw, del.

F Huth, Lithr Edinr



Mosque of Suleiman Osch, Fergana and Saracoschen Hills, Turkestan.

56. CROCUS KOROLKOWI.

Section Nudiflori; sub-paralleli *(Herbert)*: Holostigma; vernal *(Baker)*.

Crocus Korolkowi, (Regel & Maw), G. Maw in Gard. Chron., April 24, 1880, new ser., vol. xiii, p. 531; in Regel's Descript. Pl. Nov., Fasc. vii, p. 203; Synops. Genus Crocus in Gard. Chron., new ser., vol. xv, p. 718; in The Garden, vol. xxi, num. 532, p. 69; and Hist. Crocus in Journ. Linn. Soc., Bot., vol. xix, p. 373; Regel Act. Petrop., xv, p. 499; H. N. Ridley in Journ. Bot., June, 1885, p. 185.

C. Korolkovii, Boiss., Fl. Orient., vol. v, part i, p. 109.

Cormus $\frac{3}{4}$ poll. (0.019 metr.) altus et latus. Tunica membranacea fibris tenuibus parallelis intertextis, subreticulatis. Vaginæ quam spatha breviores, scapos plures involventes. Folia 8—12, ad florationem fauce perianthii ferme æquantia, $\frac{1}{12}$ poll. (0.0021 metr.) lata, carina concava quam lamina profunde concava parum angustior. Spatha 1—2 valvulis membranaceis confecta. Perianthium: faux glabra, segmenta aurantiaca, exteriora extus brunneo suffusa, 1 poll. (0.025 metr.) longa, $\frac{1}{4}$ poll. (0.0063 metr.) lata, quam interiora parum longiora. Antheræ aurantiacæ, $\frac{5}{12}$ poll. (0.011 metr.) longæ, oblongæ vix acuminatæ, apicibus haud divergentibus. Stylus ad medium antherarum fissus; stigmata aurantiaca integra, antheris vix æquantia. Capsula et semina ignota.

Corm about three-quarters of an inch (0.019 metre) broad and high. *Tunic* membranous, with an intermixture of fine parallel fibres tending to reticulation; the *Cap* produced into a fibro-membranous tuft, reaching three-quarters of an inch (0.019 metre) above the summit of the corm.

Sheathing Leaves about five, from half an inch to three inches (0.013—0.075 metre) long, falling short of the proper spathes.

Proper Leaves from eight to twelve, reaching to the throat at the flowering-time, and produced to a length of about twelve inches (0.300 metre) at maturity, one-twelfth of an inch (0.0021 metre) broad, glabrous; the keel concave, nearly equalling the width of the blade, which is also deeply concave; the lateral channels containing one prominent ridge.

Proper Spathe diphyllous, about an inch and a half (0.038 metre) in length, exceeding the sheathing leaves.

Perianth: Tube about three inches (0.075 metre) in length from the ovary to the throat. *Throat* glabrous. *Segments* from an inch to an inch and a quarter (0.025—0.032 metre) long and one quarter of an inch (0.0063 metre) broad, the three inner segments somewhat shorter than the outer; orange; the three outer segments externally suffused with brown.

Stamens about five-eighths of an inch (0.016 metre) high; the orange *Anthers* about three or four times the length of the short orange slightly hairy *Filament*. *Pollen Grains* $\frac{1}{370}$ of an inch (0.00007 metre) in diameter, channelled with spiral depressions.

Pistil from half an inch to three-quarters of an inch (0.013—0.019 metre) high from the throat; the *Style* dividing at or below the level of the summit of the anthers, and shortly produced into entire orange stigmata, which sometimes exceed the level of summit of the anthers.

Scape about an inch and a half (0.038 metre) high at the flowering-time; there are several scapes within each set of sheathing leaves.

Capsule and *Seed* unknown.

Crocus Korolkowi was discovered by General Korolkow during the Russian expedition to Chiwam, between Taschkent and Karak-ati, in clayey soil, near the river Kly, in Turkestan, and near Boroldai, in the Kara Tau mountains, in western Turkestan. It has also been gathered by Fedtschenko around Samarkand, at Dargam, near Samarkand, and in the valley of the river Saravschan, in the Aksai mountains. It seems to be generally distributed between 35° and 45° north latitude, and 63° and 70° east longitude. I am indebted to Dr. Regel for dried specimens of this Crocus. He sent them to me in April, 1880, under the name of *C. aureus*, Sibth. and Smith, and at his request I drew up a description of it which was published

Fig 1, vernal.

Fig. 2, April 24th

CROCUS KOROLKOWI, *Regel & Maw.*

J. Maw del.

F. Huth Lith^r Edin^r

at p. 213 of the 7th. Fasciculus of his *Descriptiones Plantarum*. In 1882 Dr. Regel succeeded in obtaining a supply of the living corms, which with his usual liberality have been widely distributed among cultivators. Since then it has been gathered, in the spring of 1885, by the Afghan Boundary Commissioners on the northern frontier of Afghanistan. Mr. W. Simpson collected a few specimens at Bala Murghab on the level ground of the valley, 63° east longitude, and between 35° and 39° north latitude, where he found the plant growing in great quantities and flowering at the end of January and the beginning of February. Specimens were sent by Mr. Simpson to the British Museum, and identified as *C. Korolkowi* by Mr. H. N. Ridley, who recorded the discovery at page 185 of the *Journal of Botany* for June, 1885. It flowers towards the end of February in cultivation.

C. Korolkowi somewhat resembles *C. aureus*, Sibth. and Smith, though it is of much smaller stature. It differs from *C. aureus* in the following characters:—Its corm tunic consists of thin membrane interlaced with true fibres, which are generally parallel, with a tendency to reticulation. The segments are much smaller than those of *C. aureus*, and the outer divisions are externally suffused with brown; the pistil is higher in proportion to the height of the stamens; and the division of the stigmata more distinct; the anthers are nearly vertical instead of being divergent; and the filaments much shorter in proportion to the length of the anthers. The leaves are glabrous and much narrower, and present a different section, the keel being nearly as wide as the blade.

The occurrence of this species so far east is of great interest, no other orange Crocus being known east of the borders of the Black Sea, distant more than a thousand miles west of Samarkand. Its habitat is intermediate between the West Caspian district, till lately supposed to be the most eastern limit of the genus, and the Ala Tau range, the home of *C. alatavicus*, which is four hundred miles still further to the north-east in Central Asia.

These discoveries open up an immense region, hitherto but little explored, and in which more species of the genus may yet be met with.

REFERENCES TO PLATE LVI.

Fig. 1. Flowering-state, February, actual size (from wild specimens).
Fig. 2. With matured leaves, April 24th, actual size (cultivated).
Fig. 3. Diagrammatic dissection of scape, ovary, and spathes, actual size.
Fig. 4. Stamens and Pistil, magnified two-fold.
Fig. 5. Stigmata, magnified six-fold.
Fig. 6. Section of leaf, magnified six-fold (cultivated).
Fig. 7. *a*, *b*, Corm tunic, magnified two-fold.

56*b*. CROCUS BILIOTTII.

Section: Involucrati; parallelo-fibrosi *(Herbert)*: Odontostigma; vernal *(Baker)*.

Crocus Biliottii, new species, G. Maw, Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, p. 303; in The Garden, vol. xxi, num. 532, p. 67; and Hist. Crocus in Journ. Linn. Soc., Bot., vol. xix, p. 372; Boiss., Fl. Orient., vol. v, part i, p. 99.

Cormus $\frac{1}{3}-\frac{1}{2}$ poll. (0.0084—0.013 metr.) latus. Tunica membranacea, basi in fibris angustis fissa; tunica basalis fibris brevibus planis radiatis confecta, sine annulis. Vaginæ quam spatha breviores. Folia in cormo tria, circiter $\frac{1}{12}$ poll. (0.0021 metr.) lata, glabra, canaliculis lateralibus costatis, ad faucem in florationem extensa. Spatha basalis ovarium multo superans, et ferme spatha vera æqualis. Spatha vera monophylla. Perianthium: segmenta 1 poll. (0.025 metr.) longa, $\frac{1}{2}$ poll. (0.013 metr.) lata, splendide purpurea macula obscuriore apud faucem. Antheræ flavæ, filamenta duplicantes et quam stigmata parum breviores. Stylus supra bases antherarum fissus in stigmatibus sub-integris aurantiacis fimbriatulis.

Corm from a third of an inch to half an inch (0.0084-0.013 metre) broad, and half an inch (0.013 metre) high. *Tunic* membranous, splitting up into narrow fibroid divisions at the base; the *Cap* produced upwards into a fibro-membranous tuft about a third of an inch (0.0084 metre) high. *Basal Tunic (without annuli)* of short radiating fibres.

Sheathing Leaves three or four, from half an inch to three inches (0.013—0.075 metre) in length, falling short of the proper spathe.

Proper Leaves about three, reaching to the level of the proper spathe at the flowering-time, and produced at maturity to a length of ten inches (0.250 metre), one-eighth of an inch (0.0032 metre) broad, glabrous; the keel one-fifth the width of the blade; the lateral channels wide and open, containing two or three prominent ridges.

Proper Spathe diphyllous or occasionally monophyllous, from an inch and a half to two inches (0.038—0.050 metre) long, sometimes springing from the scape between the ovary and the corm.

Perianth: Tube about three inches (0.075 metre) long from the ovary to the throat. *Throat* glabrous. *Segments* about an inch (0.025 metre) long, and a third of an inch (0.0084 metre) broad, rich purple with a darker blotch at the base; the outer and inner segments similarly coloured.

Stamens about five-eighths of an inch (0.016 metre) high; the *Anthers* orange, about twice the length of the white or pale cream-coloured *Filament*. *Pollen Grain* $\frac{1}{340}$ of an inch (0.00007 metre) in diameter, orange, sculptured with sinuous channels.

Pistil about $\frac{11}{16}$ of an inch (0.017 metre) high, slightly exceeding the anthers; the *Style* dividing at the level of the middle of the anthers, and produced into erect, sub-entire, orange stigmata.

Scape at the flowering-time about two inches (0.050 metre) in height.

Capsule and *Seed* unknown.

Crocus Biliottii was discovered by a native of Kroom, near Stauros, south of Trebizond, in the vicinity of Stauros, latitude 40° 20′ north, longitude 40° east, where it was in full flower on the 28th of May, 1880. In general aspect it is scarcely distinguishable from *C. aërius*, but the main tunic consists of thin fibro-membrane, and the basal tunic of radiating fibres instead of annuli; the pollen grain is also notably larger than that of *C. aërius*. The wild plant was probably obtained at a high elevation, which will account for its late flowering-time. In cultivation it flowers from the end of January to the middle of March. It is a more robust plant than *C. aërius*, the leaves being larger and coarser. I have much pleasure in naming it after Mr. A. Biliotti, Her Majesty's Consul at Trebizond, through whose instrumentality it was discovered and introduced to cultivation.

REFERENCES TO PLATE LVI*b*.

Fig. 1. Flowering-state, January 26th to March 15th, actual size.
Fig. 2. Inner surface of outer segment, actual size.
Fig. 3. With matured leaves, April 12th, actual size.
Fig. 4. Diagrammatic dissection of scape, ovary, and spathes, actual size.
Fig. 5. Stamens and Pistil, magnified two-fold.
Fig. 6. Pollen Grain, magnified one hundred and fifty-fold.
Fig. 7. Stigmata, magnified six-fold.
Fig. 8. Section of leaf, magnified six-fold.
Fig. 9. Corm tunics, magnified two-fold: *a*, cap; *b*, main tunic; *c*, basal tunic.

Fig. 6 × 150.

Fig. 1, Jan.y 26th to March 15th

CROCUS BILIOTTII, *G. Maw.*

J. Maw del.

F. Huth Lith.r Edin.r

DIVISION II.—NUDIFLORI. Continued.

Species without a basal spathe.

Section III.—ANNULATI.

Species with a basal corm tunic composed of coriaceous annuli.

Spring Flowering.—

57. C. cyprius.
58. aërius.
59. biflorus.
60. Crewei.
61. tauri.
62. chrysanthus.
63. Danfordiæ.

Autumn Flowering.—

64. speciosus.
65. pulchellus.

57. CROCUS CYPRIUS.

Section: Nudiflori; parallelo-fibrosi *(Herbert)*: Odontostigma; vernal *(Baker)*: Annulati *(Maw)*.

Crocus cyprius, Boiss. and Kotschy in Unger and Kotschy's Insel. Cypern., p. 203; Boiss., Fl. Orient., vol. v, part i, p. 113; G. Maw, Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, p. 748; in The Garden, vol. xxi, num. 532, p. 69; and Hist. Crocus in Journ. Linn. Soc., Bot., vol. xix, p. 373.

C. Cambessedesii, (not *C. Cambessedesii*, Gay), Klatt Revis. Irid. in Linnæa, vol. xxxiv, p. 684.

C. aërius, in part, Baker, Rev. Sp. Crocus in Gard. Chron., new ser., 1873, p. 609; List Crocus in Journ. R. Hort. Soc. Lond., new ser., vol. iv, 1877; and Syst. Iridac. in Journ. Linn. Soc., Bot., vol. xvi, p. 83.

Cormus $\frac{1}{2}$ poll. (0.013 metre) latus. Tunica fibro-membranacea, a basi in laciniis angustis planis fibrosis fissa; tunica basalis annulis 1—2 membranaceis confecta. Vaginæ spatha ferme æquantes. Folia 3—4, glabra, 4—6 poll. (0.100—0.150 metr.) longa ad florationem, fauce æquantia vel flores superantia, $\frac{1}{8}$ poll. (0.0032 metr.) lata, carina angustissima et prominente, canaliculis lateralibus latis apertis. Spatha monophylla. Perianthium: faux glabra, extus purpurea; segmenta insigne lilacina, macula purpurea ad basin, $\frac{3}{4}$ poll. (0.019 metr.) longa, $\frac{1}{4}$ poll. (0.0063 metr.) lata, obtusa. Antheræ aurantiacæ, quam filamenta coccinea dimidio breviores. Stylus ad apices antherarum fissus; stigmata integra. Semina aurantiaco-coccinea.

Corm about half an inch (0.013 metre) broad and high. *Tunic* fibro-membranous, the main tunic splitting up from the base into narrow fibre-like divisions. *Basal Tunic* composed of one or two membranous annuli.

Sheathing Leaves three or four, from half an inch (0.013 metre) to three or four inches (0.075—0.100 metre) long, falling a little short of the proper spathe.

Proper Leaves three or four, reaching to, or above, the flowers at the flowering-time, barely one-eighth of an inch (0.0032 metre) wide, glabrous; the keel one-sixth the width of the blade; the lateral channels wide and open.

Proper Spathe monophyllous, tubular, nearly two inches (0.050 metre) long and reaching within half an inch (0.013 metre) of the throat.

Perianth: Tube about three inches (0.075 metre) long from the ovary to the throat. *Throat* unbearded. *Segments* ovato-lanceolate, three-quarters of an inch (0.019 metre) long, and one-quarter of an inch (0.0063 metre) broad; bright lilac, with a dark purple blotch towards the base.

Stamens shorter than the pistil, about half an inch (0.013 metre) high; the orange *Anthers* about twice the length of the scarlet *Filament*.

Pistil about three-quarters of an inch (0.019 metre) high; the *Style* dividing above the level of the summit of the anthers, and shortly produced into sub-entire, fringed, scarlet stigmata.

Scape at the flowering-time about an inch and a quarter (0.032 metre) high.

Capsule and *Seed* unknown.

Crocus cyprius was discovered by Theodor Kotschy on the 5th of April, 1859, in full flower in or above the wooded region of the Cyprian Olympus, above the village of Prodromos in the direction of Trodos, at an altitude of about five thousand feet. It is certainly distinct from *Crocus aërius*, with which Baker associated it. The flower is much smaller and different in aspect; the corm tunic is membranous rather than coriaceous; and the annulate character of the basal tunic is less marked. The scarlet filament is peculiar to the species.

Crocus cyprius has not yet been introduced to cultivation.

REFERENCES TO PLATE LVII.

Fig. 1. Flowering-state, April 5th, actual size.
Fig. 2. Stamens and Pistil, magnified two-fold.
Fig. 3. Stigmata, magnified six-fold.
Fig. 4. Diagrammatic dissection of scape, ovary, and spathes, actual size.
Fig. 5. Section of leaf, magnified six-fold.
Fig. 6. Corm tunics, magnified two-fold: *a*, main tunic; *b*, basal tunic.

CROCUS CYPRIUS, *Boissier & Kotschy.*

J. Maw del.

F. Huth, Lith.r Edin.r

The city of Broussa and Mount Olympus.

58. CROCUS AËRIUS.

Section: Nudiflori; parallelo-fibrosi *(Herbert)*: Odontostigma; vernal *(Baker)*: Annulati *(Maw)*.

Crocus aërius, Herbert, Hist. Crocus, sp. 38, p, 42; from Journ. Hort. Soc. Lond., vol. ii, p. 288; and vars. *stauricus*, and *pulchricolor*. Baker, Rev. Sp. Crocus in Gard. Chron., new ser., 1873, p. 609; List Crocus in Journ. R. Hort. Soc. Lond., new ser., vol. iv, 1877; and Syst. Iridac. in Journ. Linn. Soc., Bot., vol. xvi, p. 83; G. Maw, Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, p. 748; in The Garden, vol. xxi, num. 532, p. 69; and Hist. Crocus in Journ. Linn. Soc., Bot., vol. xix, p. 373; Boiss., Fl. Orient., vol. v, part i, p. 113.

C. Sibthorpianus var. *staurieus*, Herbert in Bot. Reg. 1845, vol. xxxi, Misc., p. 5 (not 1843, vol. xxix, p. 28)

C. pulchricolor, Tchihatcheff, Asie Min., part iii, Bot., vol. ii, p. 523.

(Not *C. Pestalozzæ*, Boiss., which is a var. of *C. biflorus;* not *C. cyprius*, Boiss., and Kotschy.)

Cormus $\frac{1}{2}$ poll. (0.013 metr.) latus et altus. Tunica cartilaginea, tenuior quam ullæ specierum annulatarum sequentium; tunica basalis, duo vel tres annuli. Vaginæ quam spatha breviores. Folia fauce ad florationem æquantia, angustissima, $\frac{1}{16}$ poll. (0.0016 metr.) lata, glabra matura 10-12 poll. (0.250—0.300 metr.) longa, in canaliculis lateralibus costis prominentibus. Spatha diphylla, fauce semi-poll. (0.013 metr.) brevior. Perianthium: faux flava, glabra; segmenta $\frac{3}{4}$—1 poll. (0.019—0.025 metr.) longa, $\frac{1}{3}$—$\frac{1}{2}$ poll. (0.0084—0.0130 metr.) lata, insigniter cærulescens purpurea, exteriora extus atro-purpureo varie ornata, basi purpureo-maculata vel omnino atro-purpureo suffusa. Antheræ aurantiacæ, quam filamenta flava parce papillosa bis longiores. Stylus versus basin antherarum fissus, stigmata erecta integra, aurantiaco-coccinea, antheris ferme æquantia. Semina atrorufa papillosa.

Corm about half an inch (0.013 metre) broad and high. *Tunic* coriaceous, though thinner than that of the following annulate species. *Basal Tunic* consisting of two or three narrow annuli; roots, exceptionally numerous.

Sheathing Leaves about four, from half an inch to three inches (0.013—0.075 metre) in length, falling short of the proper spathe.

Proper Leaves about three, just appearing and reaching to the throat at the flowering-time, and produced to a length of about a foot (0.300 metre) at the maturity of the capsule, one-sixteenth of an inch (0.0016 metre) broad, glabrous; the convex keel about one-third the width of the blade, the reflected margins of which nearly close in the lateral channels which contain a prominent ridge.

Perianth: Tube about three inches (0.075 metre) in length from the ovary to the throat. *Throat* unbearded, yellow. Segments from three-quarters of an inch (0.019 metre) to an inch (0.0025 metre) in length, and from one-third to half an inch (0.0084—0.013 metre) broad; bright bluish purple, the outer segments variously feathered with dark purple, blotched at the base with purple, or evenly suffused with purple darker than the general colour of the segments.

Stamens equalling the pistil, from half an inch to five-eighths of an inch (0.013—0.016 metre) high; the yellow *Anthers* more than twice the length of the yellow, slightly papillose, *Filaments. Pollen Grain* $\frac{1}{500}$ of an inch (0.00005 metre) in diameter, slightly papillose, orange.

Pistil from half an inch to five-eighths of an inch (0.013—0.016 metre) in height above the throat; the *Style* dividing at the level of the middle or base of the anthers, and produced into erect, entire, orange-scarlet stigmata, which reach to about the level of the summit of the anthers.

Scape an inch and a half (0.038 metre) high at the flowering-time, produced to a height of three inches (0.088 metre) at the maturity of the capsule.

Capsule purple, half an inch (0.013 metre) high, and one quarter of an inch (0.0063 metre) broad.

Seed dark red, papillose, one-seventh of an inch (0.0036 metre) high, and one-tenth of an inch (0.0025 metre) broad; the chalaza, raphe, and caruncle of the same colour as the body of the seed.

Fig. 3. June 8th

CROCUS AËRIUS, *Herbert*

C. Sibthorpianus, Herbert.

G. Maw del.

F Huth, Lith^r Edin^r

Crocus aërius is essentially a mountain species, occurring at elevations of from four thousand five hundred to seven thousand feet, at intervals from the western extremity of Asia Minor to Kurdistan, through 17° of longitude. All the recorded habitats are in nearly the same latitude, between 40° and 41° north. Aucher-Eloy gathered it near the snow on the summit of Mount Olympus, or Kechish (Keschisch) Dagh, above Broussa; and in 1877 I found it abundantly on the same mountain, at elevations of from four thousand five hundred feet to five thousand five hundred feet. Herbert also records it from the Bithynian Olympus, and from the Koolak Dagh (Kolak Dagh), near Stauros, south of Trebizond; whence I may mention I have received a liberal supply of the roots through Mr. A. Biliotti, H. M. Consul at Trebizond. It occurs also between Baibourt and Erzeroum; and at elevations of from six thousand to seven thousand feet on the Teck Dagh, near Erzeroum. Mr. Ball's herbarium contains a specimen collected by Sir A. H. Layard in Kurdistan.

It flowers in May in its native mountain habitats, but as early as February in cultivation. It is nearly allied to *C. biflorus;* but its red seed, and rich purple flower readily distinguish it from that species.

The plant is not of robust habit; and is best grown to advantage under protection of a cold frame.

It produces seed readily under cultivation.

REFERENCES TO PLATE LVIII.

Fig. 1. Flowering-state, February 16th, actual size.
Fig. 2. *a, b, c.* Outer surface of segments, magnified two-fold: *d*, inner surface of segment, magnified two fold.
Fig. 3. With matured leaves and capsule, June 8th, actual size.
Fig. 4. Diagrammatic dissection of scape, ovary, spathes, and flower, actual size
Fig. 5. Stamens and Pistil, magnified two-fold.
Fig. 6. Pollen Grain, magnified one hundred and fifty-fold.
Fig. 7. Stigmata, magnified six-fold.
Fig. 8. Section of leaf magnified twelve-fold.
Fig. 9. *e, f.* Seeds, June 3rd, magnified six-fold.
Fig. 10. Corm tunics, magnified two-fold: *g*, main tunic; *h*, basal tunic.

59. CROCUS BIFLORUS.

Section: Nudiflori; parallelo-fibrosi *(Herbert)*: Holostigma; vernal *(Baker)*: Annulati *(G. Maw)*.

Crocus biflorus, Miller, Gard. Dict., eds. 7 and 8, num. 4; Andrews, Bot. Rep., tab. 362; Red., Lil., vol. v, tab. 294; Bot. Mag. tab. 845; Salisb., drawing in Bibl. Bot. Br. Museum, "Scotch Crocus *C. biflorus* var." Bouché Gattung Crocus in Linnæa, vol. i, p. 232; Bert., Desc. Zafferan Ital., num. 4; and Fl. Ital., vol. i, p. 213; Gay in Féruss. Bull. Sc. Nat., vol. xi, pp. 350 and 368; and five drawings under the names of *biflorus*, *lineatus*, and *pusillus*, Bibl. J. D. Hooker; Herb. Amat. ii, 101; Rchb. Ic. Fl. Germ., vol. ix, p. 9, tab. ccclvi, figs. 788-9; Fl. Germ., 84, 582; Ic. Crit., tab. 935-6, figs. 1256-9; Sang., Cent. Prod. Fl. Rom., add. p. 11; Loud., Bulb. Plants, tab. xxiii, fig. 3; Ledeb., Fl. Ross, iv, p. 109; De Notaris, Prosp. Fl. Ligur., p. 395; Boiss. and Buhse Cat. Pl., in Nuov. Mem. Soc. Imp. Nat. Mosc., p. 209; Tchihatcheff, Asie Min., part iii, Bot., vol. ii, p. 520; Klatt. Revis. Irid. in Linnæa, vol. xxxiv, pp. 680 and 720; Baker, Rev. Sp. Crocus in Gard. Chron., new ser., p. 434; List Crocus in Journ. R. Hort. Soc. Lond., new ser., vol. iv, 1877; and Syst. Iridac. in Journ. Linn. Soc., Bot., vol. xvi, p. 80; G. Maw, Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, p. 749; in The Garden, vol. xxi, num. 532, p. 69; and Hist. Crocus in Journ. Linn Soc., Bot., vol. xix, p. 373; Boiss., Fl. Orient., vol. v, part i, p. 112.

C. pusillus, Tenore, Cat. Hort. Nap., anno 1813; Mem. Croc. Fl. Nap., tab 2; and Fl. Nap. vol. v, p. 313, tab. 206; Bouché Gattung Crocus in Linnæa, vol. i, p. 232; Lodd., Bot. Cab., tab. 1454; Gay in Féruss. Bull. Sc. Nat., vol. xi, pp. 346 and 373; and drawing Bibl. J. D. Hooker; Ker, Irid. Gen., p. 74; Guss., Prod. Fl. Sic., vol. i, p. 50; and Fl. Sic. Syn., vol. i, p. 32; Sweet, Fl. Gard., tab. 106; Bot. Reg., vol. xxiii, tab. 1987; Vis., Fl. Dalm., vol. i, p. 119; Herbert, three drawings in Lindl. Libr. R. Hort. Soc. Lond.

C. circumscissus, Haworth in Trans. Hort. Soc. Lond., vol. i, p. 137.

C. præcox, Haworth in Eng. Bot. Suppl., tab. 2645.

C. minimus, (not *C. minimus*, De Cand., which is *C. insularis*, Gay) Bot. Mag., tab. 2991, anno 1830; Ten., Fl. Nap., vol. iii, p. 25.

C. lineatus, Jan, Elench., p. 1; Rchb., Ic. Crit., fig. 1259; Ic. Fl. Germ., vol. ix, tab. ccclvi, figs. 788-9; Fl. Germ. 74, 579; and Fl. Germ. Exsic. 2136; Gay, drawing Bibl. J. D. Hooker.

C. annulatus, var. *lineatus*, Herbert, Hist. Crocus, sp. 37, p. 40; from Journ. Hort. Soc. Lond., vol. ii, p. 286.

C. annulatus, var. *biflorus*, Herbert in Bot. Mag. 1841, sub-tab. 3861; in Bot. Reg., vol. xxix, anno 1843, misc. p. 46; and Hist. Crocus, sp. 37, var. 1, p. 39; from Journ. Hort. Soc. Lond., vol. ii, p. 285.

C. biflorus, var. *pusillus*, Baker, Rev. Sp. Crocus in Gard. Chron., new ser., 1873, p. 434; List Crocus in Journ. R. Hort. Soc. Lond., new ser., vol. iv, 1877; and Syst. Iridac. in Journ. Linn. Soc., Bot., vol. xvi, pp. 80 and 81.

C. argenteus, Sabine in Trans. Hort. Soc. Lond., vol. vii, p. 455, tab. ii, fig. 5.

C. biflorus, var. *argenteus*, Herbert, Hist. Crocus, sp. 37, var. 6, p. 40; from Journ. Hort. Soc. Lond. vol. ii, p. 286; Baker, Rev. Sp. Crocus in Gard. Chron., new ser., 1873, p. 434; List Crocus in Journ. R. Hort. Soc. Lond., new ser., vol. iv, 1877; and Syst. Iridac. in Journ. Linn. Soc., Bot., vol. xvi, pp. 80 and 81.

C. vernus, (not *C. vernus*, Allione) Moretti in Mem. Vicen., p. 242; Pollini, Fl. Veron., 1, p. 46, in part.

? C. vernus striatus vulgaris, Park., Parad., 162.

C. vernus, var. v, Seb. and Maur., Fl. Rom. Prod., p. 16.

C. vernus angustifolius parvo flore, Cup., Hort. Cath., p. 61.

C. vernus minor albicans, Seg., Pl. Veron., vol. ii, p. 55.

C. italicus, Gaud., Fl. Helv., vol. i, p. 88, in Obs. 2.

C. sylvestres vernalis, Cast., Hort. Mess., p. 6.

Var. 1. *estriatus*. Tchiatcheff, Asie Min., part iii, Bot., vol. ii, p. 520; ? K. Koch; G. Maw, Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, p. 749; in The Garden, vol. xxi, num. 532, p. 69.
C. annulatus var. *estriatus*, Herbert, Croc. Synops. in Bot. Mag. anno 1841, sub tab. 3861-2; Hist. Crocus sp. 37, var. 8, p.p. 39-40; from Journ. Hort. Soc. Lond., vol. ii, p. 286; and drawing in Lindl. Libr., R. Hort. Soc. Lond.
C. biflorus, Herbert in Bot. Reg. 1987.

Var. 2. *Weldeni*. Baker, List Crocus in Journ. R. Hort. Soc. Lond., new ser., vol. iv, 1877; and Syst. Iridac. in Journ. Linn. Soc., Bot., vol. xvi, p. 81; G. Maw, Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, p. 749; in The Garden, vol. xxi, num. 532, p. 69.
C. Weldeni, Gay, exsic, and drawing Bibl. J. D. Hooker; Hoppe ? in Bot. Zeit., anno 1840, p. 208; Baker in Bot. Mag. 1876, tab. 6211; G. Maw in Gard. Chron., new ser., 1877, p. 8.
C. annulatus, var. 4, *purpurascens*, and var. 5, *albus*, Herbert Hist. Crocus, sp. 37, p.p. 39-40; from Journ. Hort. Soc. Lond., vol. ii, p.p. 285-6.
C. biflorus, Vis. Fl. Dalmat. vol. i, p. 119.

Var. 3. *nubigenus*. Baker, Rev. Sp. Crocus in Gard. Chron., new ser., 1873, p. 434; List Crocus in Journ. R. Hort. Soc. Lond., new ser., vol. iv, 1877; and Syst. Iridac. in Journ. Linn. Soc., Bot., vol. xvi, p. 81; G. Maw, Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, p. 749; in The Garden, vol. xxi, num. 532, p. 69; Boiss., Fl. Orient., vol. v, part i, p. 112.
C. nubigena, Herbert in Bot. Reg., vol. xxix, anno 1843, Misc., p. 81, num. 127.
C. annulatus, var. *nubigena*, Herbert, Hist. Crocus, sp. 37, var. 3, p. 39; from Journ. Hort. Soc., vol. ii, pp. 285-6.

Sub Var. *Pestalozzæ*, Boiss. Fl. Orient. vol. v, part i, p. 112.
C. Pestalozzæ, Boiss. Diag. ser. 1, xiii, p. 17.
? C. aërius, var. *Pestalozzæ*, Baker, Rev. Sp. Crocus in Gard. Chron., new ser., 1873, p. 609; List Crocus in Journ. R. Hort. Soc. Lond., new ser., vol. iv, 1877; and Syst. Iridac. in Journ. Linn. Soc.. Bot., vol. xvi, p. 83; G. Maw, Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, p. 749; and in The Garden, vol. xxi, num. 532, p. 69.

Var. 4, *Adami*, Baker, Rev. Sp. Crocus in Gard. Chron., new ser., 1873, p. 434; List Crocus in Journ. R. Hort. Soc. Lond., new ser., vol. iv, 1877; and Syst. Iridac. in Journ. Linn. Soc., Bot., vol. xvi, p. 81; G. Maw, Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, p. 749; and in The Garden, vol. xxi, num. 532, p. 69; *C. Adami*, Gay in Féruss. Bull. Sc. Nat., vol. xxv, p. 319 (219); and two drawings, Bibl. J. D. Hooker; K. Koch in Linnæa, vol. xxi, p. 632; Steven, Fl. Taurica in Bull. Nat. Mosc., 1857, num. iii, p. 67.
C. annulatus, var. *Adamicus*, Herbert, Croc. Synops. in Bot. Mag., anno 1841, sub tab. 3861, and tab. 3868; Hist. Crocus, sp. 37, var. 2, p. 39; from Journ. Hort. Soc. Lond., vol. ii, p. 285; and drawing in Lindl. Libr., R. Hort. Soc. Lond.
C. biflorus, M. Bieb., Fl. Taurica, Suppl. p. 37.
C. biflorus var. *violaceus*, Boiss. Fl. Orient., vol. v, part i, p. 112. *C. vernus* (not *C. vernus*, Allione; not *C. vernus*, Curtis, which is *C. aureus*, Sibth. and Smith) M. Bieb., Fl. Taurica, vol. i, p. 28.

Cormus oblatus, ½ poll. (0.013 metr.) latus. Tunica rigide coriacea basi fissa; tunica basalis, discus parvus annulis 2—3 superantibus. Vaginæ quam spatha breviores, scapos plures involventes. Folia glabra, synanthia et floribus æquantia, $\frac{1}{12}$ poll. (0.0021 metr.) lata, canaliculis lateralibus costatis vel ecostatis. Spatha diphylla. Perianthium: faux flava parce barbata; segmenta lilacina vel alba; filamenta exteriora extus ochracea, striis 3—5 purpureis penniformibus ornata. Antheræ aurantiacæ, quam filamenta aurantiaca papillosa longiores. Stylus in medio antherarum fissus; stigmata integra aurantiaco-coccinea antheras paullo superantia. Semina globosa ochracea glabra.

Var. 1, *estriatus*, Herb. Segmenta exteriora extus ochracea vel ochroleuca concolora 1½ poll. (0.038 metr.) longa, ¼—⅓ poll. (0.0063—0.0084 metr.) lata.

Corm oblate, about half an inch (0.013 metre) broad. *Tunic* strongly coriaceous, splitting up at the base. *Basal Tunic* a small coriaceous disc, succeeded upwards by two or three coriaceous annuli.

Sheathing Leaves about four, from half an inch to three inches in length (0.013—0.075 metre), falling short of the proper spathes.

Proper Leaves four or five, reaching above the level of the flowers, and produced at the maturity of the capsule to a length of about ten inches (0.250 metre), about one-twelfth of an inch (0.0021 metre) broad, generally glabrous, but occasionally ciliated on the margins of the blade; the keel one-fourth the width of the blade.

Proper Spathe diphyllous, tubular, two and a half inches (0.063 metre) in length, and reaching to within an inch (0.025 metre) of the throat.

Perianth: Tube about four inches (0.100 metre) long from the ovary to the throat. *Throat* slightly bearded, yellow. *Segments* in the type about an inch and a half (0.038 metre) long, and from a quarter to a third of an inch (0.0063—0.0084 metre) broad, varying from white to lilac; the outer surface of the outer segments coated with buff, and feathered with from three to five purple markings.

Stamens shorter than the pistil, fully half an inch (0.013 metre) high; the orange *Anthers* a little longer than the slightly pubescent orange *Filament*. *Pollen Grain* $\frac{1}{400}$ of an inch (0.00006 metre) in diameter, orange, glabrous.

Pistil about three-quarters of an inch (0.019 metre) high, exceeding the stamens; the style dividing at the level of the middle of the anthers, and produced into entire orange-scarlet stigmata.

Scape an inch and a half (0.038 metre) high at the flowering-time, produced to a height of two or three inches (0.050—0.075 metre) at the maturity of the capsule.

Capsule about three-quarters of an inch (0.019 metre) high, and one-third of an inch (0.0084 metre) broad.

Seed nearly globose, about one-tenth of an inch (0.0025 metre) in diameter, bright buff, slightly glandular; the chalaza, raphe, and caruncle of the same colour as the body of the seed.

The varieties of *C. biflorus*, both as regards their size and flower-colouring, are very numerous. The principal varieties are represented on Plates LIX and LIX*b*.

Var. 1, *estriatus*, (Plate LIX, Fig. 2), from Florence, generally resembles the type, except that the outer surface of the outer segments are self-coloured buff, without purple markings.

In Var. 2, *Weldeni* (Plate LIX*b*, Fig. 1, *a*, *b*, *c*), from Trieste and Dalmatia, the segments are rhombic in form; and are either pure white, or externally suffused with bright lilac frecklings.

In Var. 3, *nubigenus*, (Plate LIX*b*, Fig. 3, *h*), from Asia Minor, the flower is smaller than in the type; and the outer surface of the outer segments are freckled with purplish grey. This form was originally described by Herbert from specimens from Mount Gargarus, in the Troad. Mr. Elwes found it on the Ak Dagh, Lycia; and I also gathered it on the heights of Chamlijah, east of Scutari, opposite Constantinople: with it grew a distinctly feathered form also represented on Plate LIX, Fig. 3, *h*.

Sub-Var. *Pestalozzæ* (Plate LIX*b*, Fig. 4, *k*, *l*, *m*, *n*, *o*), *C. Pestalozzæ* of Boissier, is I think only an albino of Herbert's var. *nubigenus*, as at Maslack, on the right hand side of the road between Constantinople and Therapia, it grows intermixed with the feathered form found on Chamlijah, near Scutari. It also occurs at Bolu, and on the slightly elevated plain of Erenkioi (Eren Keni), sloping towards the Sea of Marmora, on the Asiatic side of the Bosphorus.

Var. 5, *Adami*, *C. Adami* of Gay, *C. Adamicus* of Herbert (Plate LIX*b*, Fig. 2, *e*, *f*, *g*), is the eastern representative of the species from Georgia. In this the flower is either self-coloured pale purple or, as represented in the *Botanical Magazine*, tab. 3868, with the outer surface of the outer segments feathered with dark purple.

The type form, (Plate LIX, Fig. 1), is also very variable in size and in the colour of the segments, which ranges from white to violet; but these differences are so gradual that it would be useless to apply names to the different stages of variation.

Crocus biflorus has long been in cultivation; and the most familiar garden form is the "*Cloth of Silver*," or Scotch Crocus (Plate LIX, Figs. 3 and 4), apparently identical with Tenore's var. *β*, found wild between Ariano and Monte Calvello in South Italy.

Crocus biflorus flowers in the early spring from January to March. It has a wider range from west to east than any other species, extending from Genoa into north-west Persia, through forty degrees of longitude; and ranging north and south from Podolia to Lycia, through eleven or twelve degrees of latitude. The western forms of the species are paler in colour than those from the east, in which purple flower-colouring prevails.

It is generally a lowland plant. I know of no records of its occurrence in Europe at alpine elevations, though it is said to reach elevations of from four thousand to six thousand feet in Lycia and the Caucasus. It occurs very generally throughout Italy from Lombardy to the north of Sicily, and has been recorded from the following localities:—The Island of Elba; meadows near Monte Baldo, on the east side of the Lake of Garda; Verona, on the height above the city and in meadows near the Porta Vittoria; Brescia; Bergamo; Milan; Mantua; Parma; Bologna; Genoa, its most western known habitat; Lucca and Pisa. Near Florence it occurs in the Cascine, and also at Certosa, where the striped type form grows intermixed with the variety *estriatus*. A large striped form grows in the woods on Monte Senario at an elevation of two thousand five hundred feet. In the Botanic Garden at Rome both the type form and var. *estriatus* are found growing spontaneously; and a pure white variety occurs in the garden of the Villa Borghese. A bluish variety occurs at Ossolini, near Naples. The type occurs also in the park at Caserta; near Naples, in the Valle de St. Rocca; at Camaldoli; at Albano; on Monte Barbara; and in a wood between Pozzuoli and Naples; and Monte Flaito, above Castellamare; at Melfi at the foot of Monte Vulture, on the east side of the Apennines; between Ariano and Monte Calvello; near Monte Vallone; St. Silvester; Tavoliere di Puglia; Bari; Persano; Monte Pisano; and near Potenza and Montalbano in the Basilicata. In Sicily it occurs along the north coast at Mistretta, Caronia, and San Fratello. Near Trieste at Gabrovizza, Prosecco, and Opschina var. *Weldeni* occurs, and also its white sub-variety, occasionally intermixed with the type feathered form.

The var. *Weldeni* is not unfrequent in sunny pastures on the Dalmatian coast south of Trieste, as at Lemess; between Dernis and Verlika; on Mount Marian near Spalatro; at Radigne; Beliak; and on Monte Bossanka, and other mountains about Ragusa. It has also been recorded from Istria, and from Mount Klan, in Southern Servia.

It is not a frequent species in Greece and Turkey, but has been recorded from

CROCUS BIFLORUS, *Miller.*

C. pusillus, Tenore. C. annulatus var. biflorus, Herbert. C. circumcissus, Haworth.

Fig. 2. Var. estriatus, Herbert.

Nauplia in the Morea, and from the Balkans. A small striped variety, and var. *nubigenus* and its albino *Pestalozzæ*, occur at Maslack between Constantinople and Therapia; and the same small varieties occur on the Asiatic side of the Bosphorus; on the hill of Chamlijah, above Scutari; near Bolu; and on the slightly elevated plain of Erenkioi (Eren Keni) sloping towards the Sea of Marmora. Herbert's type specimens of his variety *nubigenus* were obtained from the summit of Mount Gargarus, in the Troad, and Mr. Elwes gathered it also on the Ak Dagh in Lycia, at an altitude of four thousand feet. Mrs. Danford gathered an annulate species in the Cilician Taurus, which appears to be a variety of *C. biflorus*.

South Podolia, on the authority of Trautvetter, appears to be the limit of the northern range of this species. It also occurs in the neighbourhood of Odessa, and a large striped variety has been found at Simpheropol in the Crimea.

The blue or lilac form, var. *Adami*, both self-coloured and feathered with purple, is not unfrequent in Circassia as far east as the Caspian; and has been recorded from Tiflis; Elizabethpol; Duschet (Dushet); mountains about Lake Gokcha (Gotcha) or Sevang; also from the Talish mountains at the Chumma Pass at an elevation of six thousand feet.

The same form has been found on the mountains of north-west Persia, which appears to be the south-eastern limit of the genus, where perhaps two other species, *C. cancellatus* and *C. speciosus*, also occur.

The annulate species have so little to distinguish them except their flower-colouring, that it is not easy to decide to which species their white forms or albinos belong; I have specimens of a white annulate Crocus, collected by Dr. Dingler near Adrianople, which may be either an albino of *C. chrysanthus* or of *C. biflorus;* but I think it is a form of *C. chrysanthus*, which species is also found there.

From their hardy habit and the freedom with which they flower, the larger varieties of *Crocus biflorus* are especially suitable for open air garden culture, and they are readily multiplied from seed.

REFERENCES TO PLATE LIX.

Fig. 1. Flowering-state of type form from Florence, March 10th, actual size.
Fig. 1*b*. Flowering-state of var. *estriatus* from Florence, March 10th, actual size.
Fig. 2. With matured leaves and capsule, June 2nd, actual size.
Fig. 3. Outer surface of outer segment of "Cloth of Silver," or Scotch Crocus, actual size.
Fig. 4. Outer surface of inner segment of "Cloth of Silver," or Scotch Crocus, actual size.
Fig. 6. Diagrammatic dissection of scape, ovary, and spathes, actual size.
Fig. 7. Stamens and Pistil, magnified two-fold.
Fig. 8. Pollen Grain, magnified one hundred and fifty-fold.
Fig. 9. Stigmata, magnified six-fold.
Fig. 10. Basal tunic of Corm, magnified two-fold.
Fig. 11. Section of leaf, magnified six-fold.
Fig. 12. Capsule, actual size.
Fig. 13. Seed, magnified six-fold.

REFERENCES TO PLATE LIX*b*.

Fig. 1*a*. Flowering-state of var. *Weldeni*, actual size.
Fig. 1*b*. Flower of the white form of var. *Weldeni*, actual size.
Fig. 1*c*. Outer surface of outer segment of var. *Weldeni*, actual size.
Fig. 1*d*. Section of leaf of var. *Weldeni*, magnified six-fold.
Fig. 2*e*. Flower of var. *Adami*, actual size.
Fig. 2*f*. Stamens and Pistil of var. *Adami*, magnified two-fold.
Fig. 2*g*. Section of leaf of var. *Adami*, magnified six-fold.
Fig. 3*h*. Flowering-state of var. *nubigenus*, February 21st, actual size.
Fig. 3*i* Stamens and Pistil of var. *nubigenus*, magnified two-fold.
Fig. 3*j*. Section of leaf of var. *nubigenus*, magnified six-fold.
Fig. 4*k*. Flowering-state of sub-var. *Pestalozzæ*, January 21st, actual size.
Fig. 4*l*. Pollen Grain of sub-var. *Pestalozzæ*, magnified one hundred and fifty-fold.
Fig. 4*m*. Stamen and Pistil of sub-var. *Pestalozzæ*, magnified two-fold.
Fig. 4*n*. Section of leaf of sub-var. *Pestalozzæ*, magnified six-fold.
Fig. 4*o*. Filament of sub-var. *Pestalozzæ*, magnified ten-fold.

CROCUS BIFLORUS, *Miller.*

C. pusillus, Tenore. C. annulatus, var. biflorus, Herbert. C. circumcissus, Haworth.
Fig. 1, var. WELDENI, *Gay. Fig. 2, var.* ADAMI, *Gay. Fig. 3, var.* NUBIGENUS, *Herbert.*
Fig. 4, var. PESTALOZZŒ, *Boiss.*

Syra.

60. CROCUS CREWEI.

Section: Nudiflora; parallelo-fibrosi *(Herbert)*: Holostigma; vernal *(Baker)*: Annulati *(G. Maw)*.

Crocus Crewei, J. D. Hooker, in Bot. Mag., anno 1875, tab. 6168; Baker, Syst. Iridac. in Journ. Linn. Soc., Bot., vol. xvi, p. 80; G. Maw in The Garden, vol. xiv, num. 364, p. 420, tab. cccliii, fig. 6; and vol. xxi, num. 532, p. 69; Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, p. 749; and Hist. Crocus in Journ. Linn. Soc., Bot., vol. xix, p. 373; Boiss., Fl. Orient., vol. v, part i, p. 112.

C. melantherus, Boiss. and Orph., pl. exsic. 1870.

Cormus $\frac{1}{2}$ poll. (0.013 metr.) latus, $\frac{1}{3}$—$\frac{1}{2}$ poll. (0.084—0.013 metr.) altus. Tunica coriacea, superne et inferne fissa; tunica basalis, 1—2 annuli coriacei, marginibus exterioribus cuspidibus radiatis densis munitis. Vaginæ quam spatha breviores, scapos 2—3 involventes. Folia 3—4 synanthia et floribus æquantia, matura pedalia (0.300 metr.) glabra, $\frac{1}{10}$ poll. (0.0025 metr.) lata, costis tribus in canaliculis lateralibus. Spatha diphylla. Perianthium: faux glabra, aurantiaca; segmenta vix 1 poll. (0.025 metr.) longa, $\frac{1}{3}$ poll. (0.0084 metr.) lata, interiora alba, exteriora extus ochracea suffusa, chocolatino ornata. Antheræ atro-chocolatinæ, quam filamenta aurantiaca duplo longiores. Stylus ad basin antherarum fissus. Stigmata integra aurantiaca, antheris æquantia.

Corm about half an inch (0.013 metre) broad, and from one-third to half an inch (0.0084—0.0013 metre high. *Tunic* coriaceous, splitting up from above and below. The *Basal Tunic* consists of one or two coriaceous annuli with radiating points on their outer margin.

Sheathing Leaves about four, from half an inch to two and a half inches (0.013—0.063 metre) in length, falling short of the proper spathe and including two or three scapes.

Proper Leaves three or four, appearing with, and reaching to, the level of the flowers, produced at maturity to about twelve inches (0·300 metre) in length, one-tenth of an inch (0.0025 metre) broad, glabrous, the keel about one-third the width of the blade, the lateral channels containing three prominent ridges.

Proper Spathe diphyllous, about two inches (0.050 metre) in length, exceeding the sheathing leaves; the inner spathe ligulate, the outer tubular.

Perianth: Tube from two and a half to three inches (0.063—0.075 metre) in length from the ovary to the throat. *Throat* glabrous, yellow. *Segments* barely an inch (0.025 metre) long, and one-third of an inch (0.0084 metre) broad, white; the outer surface of the outer segments coated with buff, and feathered with rich purple markings.

Stamens equalling the pistil, half an inch (0.013 metre) high; the dark chocolate *Anthers* about twice the length of the orange *Filament*. *Pollen Grains* $\frac{1}{400}$ of an inch (0.00006 metre) in diameter, orange.

Pistil reaching to the level of the summit of the anthers, about half an inch (0.013 metre) in height from the throat; the *Style* dividing at the level of the base of the anthers, and produced into spreading, entire, orange-scarlet stigmata.

Scape about an inch and a half (0.038 metre) in height at the flowering-time.

Capsule and *Seed* unknown.

I have some hesitation in separating *C. Crewei* as a species distinct from *C. biflorus*, as its dark chocolate anthers form the only prominent character which seems to distinguish it. It appears to have been known to Boissier and Orphanides as early as 1870, and herbarium specimens from Mount Taygetes were distributed under the name of *C. melantherus*. Sir Joseph D. Hooker was the first to describe it, and in 1875 figured it in the *Botanical Magazine* (Tab. 6168) under the name of *C. Crewei*. It was collected in 1874 by Mr. Elwes, on the hill above the old town of Syra, represented in the vignette at the head of this chapter; and corms having been sent by Mr. Elwes, to the late Rev. H. Harpur Crewe and myself, Mr. Crewe was successful in flowering it in the spring of 1875, and in the following year two other corms flowered with me at Benthall.

Fig. 1, Feb^y 24th

Fig. 9 × 2

CROCUS CREWEI, *Hooker.*

C. melantherus, Boiss.

J. Maw del.

F. Huth, Lith^r Edin^r

In the Herbarium at the Jardin des Plantes, Paris, there is a specimen collected by Orphanides on Mount Hymettus near Athens; and Monsieur Boissier's Herbarium contains one from Mount Elmalu in Lycia. I received, in 1883, some Crocus corms collected by Mr. C. C. Lacaita on April the 12th, from a table-land at a height of three thousand feet between Ajanni (Hajios Joannis) and Mount Malevo (ancient Parnon) in Laconia, which have since flowered with me, and appear undistinguishable from the Syra plant. These localities range between $36\frac{1}{2}^{\circ}$ and 38° north latitude, and from 22° to 30° east longitude, at about the centre of the area of distribution of *Crocus biflorus*.

I do not think that the chocolate colouring of the anthers should be too strongly relied on as a specific distinctive character. Since the discovery and description of *C. Crewei*, a somewhat similar variation has been observed in *C. hyemalis*, the anthers of which are not unfrequently of a chocolate colour; and I have also noticed a tendency in this direction in the anthers of *C. asturicus*, *C. chrysanthus*, and *C. biflorus*.

Crocus Crewei flowers in January and February. It is not nearly so robust in habit as *C. biflorus*.

REFERENCES TO PLATE LX.

Fig. 1. Flowering-state, February 24th, actual size, flowered at Benthall from corms collected in the Island of Syra, by Mr. Elwes.
Fig. 2. With matured leaves, April 16th, actual size.
Fig. 3. Diagrammatic dissection of scape, ovary, and spathes, actual size.
Fig. 4. Outer surface of inner segment, magnified two-fold.
Fig. 5. Outer surface of outer segment, magnified two-fold.
Fig. 6. Stamens and Pistil, magnified two-fold.
Fig. 7. Pollen Grain, magnified one hundred and fifty-fold.
Fig. 8. Section of leaf, magnified six-fold.
Fig. 9. Corm tunics, magnified two-fold: *a*, cap; *b*, main tunic; *c*, basal tunic.

Lycian mountains from Adalia (Attalia). From a sketch by C. G. Danford, Esq.

61. CROCUS TAURI.

Section: Nudiflori; parallelo-fibrosi *(Herbert)*: Holostigma; vernal *(Baker)*: Annulati *(G. Maw)*.

Crocus tauri, (Aucher-Eloy, exsic. Nos. 2128 and 2654 in Herb. De Cand.) G. Maw, Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, p. 749; in The Garden, vol. xxi, num. 532, p. 70; and Hist. Crocus in Journ. Linn. Soc., Bot., vol. xix, p. 373; Boiss., Fl. Orient., vol. v, part i, p. 113.

Cormus ferme 1 poll. (0.025 metr.) latus et altus. Tunica membranacea coriacea basi fissa, superne cuspidibus acutis $\frac{1}{4}$ poll. (0.0063 metr.) altis munita. Tunica basalis, annuli crassi membranacei, 2—3 marginibus externis cuspidibus duodecim munitis. Vaginæ quam spatha breviores, scapos duos vel tres involventes. Folia glabra, 7—8, 8 poll. (0.200 metr.) longa, flores ad florationem superantes, $\frac{1}{16}$ poll. (0.0016 metr.) lata. Spatha diphylla, fauce ferme æquans. Perianthium: faux glabra, flava; segmenta pallide purpurea estriata, $1\frac{1}{4}$ poll (0.032 metr.) longa, $\frac{1}{3}$ poll. (0.0084 metr.) lata. Antheræ flava, $\frac{1}{2}$ poll. (0.013 metr.) longæ, filamenta bis superantes, quam stigmata multo longiores. Stylus infra basin antherarum fissus, stigmata brevia flava integra apice expansa, medio antherarum vix æquantia. Capsula et semina ignota.

Corm about an inch (0.025 metre) high, and three-quarters of an inch (0.019 metre) broad. *Tunic* membranous; the *Basal Tunic* consisting of two or three annuli.

Sheathing Leaves about four, from one inch to three and a half inches (0.025—0.088 metre) in length, falling short of the proper spathes, and including from two to four scapes.

Proper Leaves from seven to eight, reaching above the flowers at the flowering-time, one-sixteenth of an inch (0.0016 metre) broad, glabrous.

Proper Spathe diphyllous, about two and a half inches (0.063 metre) in length, reaching nearly to the throat; the inner spathe ligulate, the outer tubular.

Perianth: Tube about three inches (0.075 metre) in length from the ovary to the throat. *Throat* unbearded, yellow. *Segments* about an inch and a quarter (0.032 metre) long, and one-third of an inch (0.0084 metre) broad, pale, unstriped purple.

Stamens much exceeding the pistil, about three-quarters of an inch (0.019 metre) high; the orange *Anthers* about twice the length of the orange *Filament*.

Pistil three-eighths of an inch (0.010 metre) high from the throat: the *Style* dividing at the level of the base of the anthers, and shortly produced into spreading, entire, pale yellow stigmata.

Scape at the flowering-time about an inch and three-quarters (0.044 metre) high.

Capsule and *Seed* unknown.

Crocus tauri was discovered and collected by Aucher-Eloy, near the Cilician Gates of the Taurus, and his specimens, Nos. 2128 and 2654, are to be found in European Herbaria. I am indebted to Monsieur De Candolle for the loan of the specimen forming the subject of Plate LXI. There is also a specimen in the Kew Herbarium which I do not doubt is identical with Aucher-Eloy's plant. It was collected by Mr. Elwes, on April 9th, 1874, at an altitude of from five thousand to six thousand feet, near the Saw Mills in the open parts of the Cedar Forest of Œnoni, on the north side of the Pass on the road from Kassaba to Arsa, across the Ak Dagh, Lycia. It ranges in longitude from $29\frac{1}{2}^\circ$ to $34\frac{1}{2}^\circ$ east, and in north latitude, from $36\frac{1}{2}^\circ$ to $37\frac{1}{2}^\circ$.

Crocus tauri is vernal. It is more nearly allied to *C. biflorus* than to any other species, but is readily distinguished by its exceptionally short, pale yellow pistil, its self-coloured flowers, and its thinner corm tunic which approaches more nearly

Fig. 1, vernal.

CROCUS TAURI, *G. Maw.*

Spec. nov. Aucher-Eloy. Nos 2128. & 2654 Herb. D. C.

G. Maw del.

F. Huth, Lith.t Edin.r

that of *C. speciosus* than the strong coriaceous tunic of *C. biflorus*. It is also a plant of more robust habit than any eastern form of *C. biflorus*.

It has not yet been introduced to cultivation.

REFERENCES TO PLATE LXI.

Fig. 1. Flowering-state, vernal, actual size.
Fig. 2. Diagrammatic dissection of scape, ovary, and spathes, actual size.
Fig. 3. Stamens and Pistil, magnified two-fold.
Fig. 4. Stigmata, magnified six-fold.
Fig. 5. Corm tunics, magnified two-fold: *a*, cap; *b*, main tunic; *c*, basal tunic.

62. CROCUS CHRYSANTHUS.

Section: Nudiflori; parallelo-fibrosi *(Herbert)*: Holostigma; vernal *(Baker)*: Annulati *(G. Maw)*.

Crocus chrysanthus, (not *C. chrysanthus*, Herbert in Bot. Reg., vol. xxxiii, tab. 4, fig. 1, which is *C. suterianus*, Herbert) Herbert, Hist. Crocus, sp. 36, p. 39; from Journ. Hort. Soc. Lond., vol. ii, p. 285; and drawing in Lindl. Libr. R. Hort. Soc. Lond; Klatt, Revis. Iridac. in Linnæa, vol. xxxiv, pp. 685 and 721; Baker, Rev. Sp. Crocus in Gard. Chron., new ser., 1873, p. 291; List Crocus in Journ. R. Hort. Soc. Lond., new ser., vol. iv, 1877; and Syst. Iridac. in Journ. Linn. Soc., Bot., vol. xvi, p. 80; Fl. Mag., tab. iii, fig. 1, 1874; J. D. Hooker in Bot. Mag. 1875, tab. 6162; G. Maw in The Garden, vol. xiv, num. 364, p. 420, tab. cliii; and vol. xxi, num. 532, p. 70; Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, p. 780; and Hist. Crocus in Journ. Linn. Soc., Bot., vol. v, part i, p. 111.

C. annulatus, var. *chrysanthus*, Herbert, Croc. Synops. in Bot. Mag., 1841, sub tabs. 3861 and 3862; and in Bot. Reg., vol. xxix, 1843, misc., p. 27.

C. croceus, K. Koch in Linnæa, vol. xix, p. 7.

C. sulphureus, (not *C. sulphureus*, Ker, which is a horticultural form of *C. aureus*, Sibth. and Smith) Griseb., Spic. Fl. Rumel. and Bithyn., vol. ii, p. 373; Tchihatcheff, Asie Min., part iii, Bot., vol. ii, p. 520; Heldr. Herb. Nom.

C. mœsiacus, (not *C. mœsiacus*, Ker, which is *C. aureus*, Sibth. and Smith) J. Gay in Balansa Plant. Orient. exsic. num. 33.

Var. 1. *fusco-tinctus*, Baker in Gard. Chron., new ser., 1876, pp. 622-3; G. Maw in The Garden, vol. xiv, num. 364, p. 420, tab. cliii; and vol. xxi, num. 532, p. 70; Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, p. 720.

Var. 2. *fusco-lineatus*, Baker in Gard. Chron., new ser., 1876, pp. 622-3; G. Maw, Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, p. 722; in The Garden, vol. xxi, num. 535, p. 70.

Var. 3. *albidus*, G. Maw, Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, p. 722; in The Garden, vol. xxi, num. 532, p. 70; Boiss. Fl. Orient. vol. v, part i, p. 111.

Var. 4. *cærulescens*, G. Maw, Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, p. 722; in The Garden, vol. xxi, num. 532, p. 70; Boiss., Fl. Orient., vol. v, part i, p. 111.

Cormus $\frac{1}{2}$—$\frac{3}{4}$ poll. (0.013—0.019 metr.) latus, $\frac{1}{2}$ poll. (0.013 metr.) altus. Tunica rigide coriacea; tunica basalis, annuli coriacei cuspidibus viginti acutis radiatis in marginibus externis muniti. Vaginæ quam spatha breviores, scapos plures involventes. Folia 5-8, synanthia et tunc floribus æquantia, matura 10 poll. (0.250 metr.) longa, $\frac{1}{16}$—$\frac{1}{22}$ poll. (0.0016—0.0021 metr.) lata, carina prominula ciliata. Spatha diphylla, fauce ferme æquans. Perianthium: faux glabra; segmenta 1—$1\frac{1}{4}$ poll. (0.025—0.032 metr.) longa, $\frac{1}{3}$ poll. (0.0084 metr.) lata, colore variabilia. Antheræ aurantiacæ, sæpius nigro-maculata in basin quam filamenta flava papillosa duplo longiores. Stylus prope vel supra apices antherarum

fissus. Stigmata patentia integra coccinea, antheras sæpius superantia. Semina coccinea, matura brunnea, vel ochroleuca matura ochracea.

Var. *a.* typicus, segmenta concolora aurantiaca.

Var. *b. albidus*, segmenta extus alba, basi flavida.

Var. *cærulescens*, segmenta alba extus purpureo et cærulescenti lilacino ornata.

Varietus pallide sulphurea in Olympo Bithynio obvia.

Corm from half an inch to three-quarters of an inch (0.013—0.019 metre) broad and high. *Tunic* coriaceous like that of *C. biflorus;* the *Basal Tunic* consisting of coriaceous annuli surrounded by about twenty sharp projecting points on their outer circumference.

Sheathing Leaves about four, from half an inch to four inches (0.013—0.100 metre) in length, falling short of the proper spathes, and enclosing several scapes.

Proper Leaves from five to seven, reaching to the level of the flowers, and produced to a length of about ten inches (0.25 metre) at maturity, one-sixteenth to one-twelfth of an inch (0.0016—0.0021 metre) broad; the keel ciliated, about one-third the width of the blade, lateral channels without ridges.

Proper Spathe diphyllous, reaching nearly to the throat, from two and a half to three inches (0.063—0.075 metre) long, the inner spathe ligulate, the outer tubular.

Perianth: Tube about three inches (0.075 metre) long from the ovary to the throat. *Throat* unbearded. *Segments* from an inch to an inch and a quarter (0.025—0.032 metre) long, and one-third of an inch (0.0084 metre) broad, bright orange, or with the outer segments suffused or feathered with rich bronze markings.

Stamens about half an inch (0.013 metre) high, equalling or falling short of the pistil; the orange *Anthers* nearly twice the length of the orange *Filament*, and occasionally tipped with black at the base. *Pollen Grain* papillose, orange, $\frac{1}{400}$ of an inch (0.0006 metre) in diameter, channelled with sinuous lines on the surface.

Pistil from half an inch to an inch (0.013—0.025 metre) high from the throat, reaching to the level of, or much above, the summit of the anthers; the *Style* dividing near the level of the summit of the anthers and produced into entire orange or yellow stigmata, which are very variable in size and colour.

Scape at the flowering-time and fruiting-time about two inches (0.050 metre) high.

Capsule three-quarters of an inch (0.019 metre) high, and one-third of an inch (0.0084 metre) broad, purple.

Seed about one-sixth of an inch (0.0042 metre) high, and one-eighth of an inch (0.0032 metre) broad, varying in colour from buff to red.

There are few species so variable in their flower-colouring as *Crocus chrysanthus*. The type colouring, (Fig. 1. *a*,) from the Yamanlar Dagh, near Smyrna, is a uniform rich orange; in vars. *fusco-tinctus* and *fusco-lineatus* of Baker, (Fig. 1. *b* and *c*,) the outer surface of the outer segments are evenly suffused or feathered with rich brown in great variety of markings. Fig. 1. *d*, var. *albidus*, I gathered on Mount Olympus, above Broussa, and the same variety was found by Dr. Dingler near Adrianople. Fig. 1. *e* and *f*, *cærulescens*, I brought from Mount Olympus, where

Fig. 1, March 6th

Fig. 2, May 28th

CROCUS CHRYSANTHUS, *Herbert.*

C. annulatus var. chrysanthus, Herbert. *C. croceus, K. Koch.*

Fig. 1, b var. fusco-lineatus, Baker. *Fig. 1, c var. fusco-tinctus, Baker.*

Fig. 1, d var. albidus, G. Maw. *Fig. 1, e f var. cærulescens, G. Maw.*

G. Maw del.

F. Huth, Lith.r Edin.r

a pale sulphur-coloured variety also occurs. Between all these varieties which grow intermixed, a series of intermediate gradations occur; and it is impossible to avoid the conclusion that they are all forms of the same species, though I know of no other instance of an orange species, varying with lilac flowers. It is possible that the lilac and tinted forms may be hybrids between *C. chrysanthus* and *C. aërius*, which grow intermixed on Mount Olympus; but in the entire absence of any other known garden or wild hybrids I hesitate to arrive at this conclusion.

Crocus chrysanthus ranges in altitude from near the sea level up to a height of four thousand or five thousand feet; and is a native of Western Asia Minor, the north of Greece, and European Turkey, extending as far north as the Dobrudscha, between latitude 38° and 45° north, and longitude $22\frac{1}{2}$° and 30° east. In Asia Minor it occurs abundantly on Mount Olympus, above Broussa, at altitudes of between three thousand to four thousand feet: between Broussa and Gemlik, I found it at an altitude of between three hundred to four hundred feet. It was found by Mr. Elwes on the Boz Dagh, east of Smyrna; and I have gathered it abundantly at altitudes of from two thousand five hundred to three thousand five hundred feet on the Yamanlar Dagh, the Taktali Dagh, and the Nymph Dagh, mountains in the neighbourhood of Smyrna. Chaubard found it on the Island of Taso (Thasos) in the Greek Archipelago. In Greece, it occurs on Mount Parnassus, and in pine Forests near the region of snow at Leucocastron above Livadi*. In European Turkey it occurs near Adrianople; between Philippopolis and Carlova; and above the village of Carlova on the Despoto Dagh. Its most northern recorded habitat is the neighbourhood of Babadagh in the Dobrudscha.

Crocus chrysanthus is a hardy and free-flowering species in cultivation, producing its flowers as early as February in the open border. In its native habitats its flowering-time varies from January to April, according to its range of altitude.

REFERENCES TO PLATE LXII.

Fig. 1. *a*, *b*. Flowering-state, March 6th, actual size.
Fig. 1. *c*. Outer surface of outer segment of var. *fusco-tinctus*, actual size.
Fig. 1. *d*. Variety *albidus*, actual size.
Fig. 1. *e*, *f*. Variety *cærulecens*, actual size.
Fig. 2. With matured leaves and capsules, May 28th, actual size.
Fig. 3. Diagrammatic dissection of scape, ovary, and spathes, actual size.
Fig. 4. *g*, *h*. Stamens and Pistil, magnified two-fold.
Fig. 5. Pollen Grain, magnified one hundred and fifty-fold.
Fig. 6. Stigmata, magnified six-fold.
Fig. 7. Section of leaf, magnified six-fold.
Fig. 8. Corm tunics, magnified two-fold: *i*, main tunic; *j*, basal tunic
Fig. 9. *k*, *l*, *m*. Seeds, magnified six-fold.

* ? Mount Levidi in the Morea.

On the Chourma Chai (Date River), Asia Minor. From a drawing by C. G. Danford, Esq.

63. CROCUS DANFORDIÆ.

Section Nudiflori; parallelo-fibrosi *(Herbert)*: Holostigma; vernal *(Baker)*: Annulati *(G. Maw)*.

Crocus Danfordiæ, G. Maw, Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, p. 781; in The Garden, vol. xxi, num. 532, p. 70; and Hist. Crocus in Journ. Linn. Soc., Bot., vol. xix, p. 373; Boiss., Fl. Orient., vol. v, part i, p. 111.

Cormus $\frac{1}{2}$ poll. (0.013 metr.) latus et altus. Tunica coriacea; tunica basalis, discus coriaceus radiis brevibus acutis cinctus et super eos annuli 1—2 marginibus externis breviter cuspidatis. Vaginæ quam spatha breviores, scapos 1—plures involventes. Folia flores superantia, matura pedalia (0.300 metr.), $\frac{1}{20}$ poll. (0.0013 metr.) lata, marginibus laminæ et carinæ ciliatis, in canaliculis lateralibus costis duabus prominulis. Spatha diphylla, fauce poll. (0.025 metr.) brevior. Perianthium: faux glabra; segmenta pallide sulphurea estriata, vel versus basin cinereo pallide suffusa, $\frac{3}{4}$ poll. (0.019 metr.) longa, $\frac{3}{8}$ poll. (0.010 metr.) lata. Antheræ flavæ, $\frac{1}{3}$ poll. (0.0084 metr.) quam filamenta flava duplo longiores, stigmata multo superantes. Stylus ad basin antherarum fissus. Stigmata integra brevissima aurantiaca.

Corm about half an inch (0.013 metre) high and broad. *Tunic* coriaceous; the *Basal Tunic* a coriaceous disc, surrounded by short pointed rays, succeeded upwards by one or two annuli.

Sheathing Leaves about four, from half an inch to three inches (0.013—0.075 metre) in length, falling short of the proper spathes and containing one or two scapes.

Proper Leaves three or four, reaching above the flowers, and produced at maturity to twelve or fourteen inches (0.30—0.35 metre) in length, one-twentieth of an inch (0.0013 metre) broad, ciliated on the margins of the keel and blade, the keel one-half the width of the blade, the lateral channel containing two prominent ridges.

Proper Spathe diphyllous, reaching to within an inch (0.025 metre) of the throat, about two inches (0.050 metre) in length, the inner spathe ligulate, the outer tubular.

Perianth: Tube two and a half inches (0.063 metre) in length from the ovary to the throat. *Throat* unbearded. *Segments* about three-quarters of an inch (0.019 metre) long, and three-eighths of an inch (0.010 metre) broad, pale sulphur yellow, the outer surface of the outer segments occasionally suffused with brown.

Stamens from three-eighths of an inch to half an inch (0.010—0.013 metre) high, much exceeding the pistil; the yellow *Anthers* about three times the length of the short yellow *Filament*. *Pollen Grains* $\frac{1}{500}$ of an inch (0.00005 metre) in diameter, yellow, the surface channelled with sinuous depressions.

Pistil barely one-quarter of an inch (0.0063 metre) high from the throat; the *Style* dividing at the level of the base of the anthers, and shortly produced into entire, orange, spreading stigmata, which reach to the level of the middle of the stamens.

Scape about an inch and a quarter (0.032 metre) high at the flowering-time, produced to a height of two inches (0.050 metre) at the maturity of the capsule.

Capsule half an inch (0.013 metre) high, and barely a quarter of an inch (0.0063 metre) broad, dark purple.

Seed one-eighth of an inch (0.0032 metre) high, and one-tenth of an inch (0.0025 metre) broad, with a prominent caruncle, dull brown in colour.

Crocus Danfordiæ was discovered in flower by Mrs. Danford, on March 9th, 1879 at Yar-puz, in the Anti-Taurus, and was also gathered by her at Tapizite in the same district, whence she forwarded me some corms. I am also indebted to the Rev. A. W. Hubbard, of the American Mission at Sivas in Asia Minor, for a liberal supply of the corms of this species, which he collected for me near Sivas in the spring of 1879. I flowered them at Benthall in February and March, 1881. The flowers vary in colour from pale citron to orange: white and

CROCUS DANFORDIÆ, *Maw.*

bluish varieties occasionally occurring, but the pale yellow shade is the prevalent colour. There is a Crocus in the Kew Herbarium, collected by Forbes in Lycia, in February, 1842, which is probably this species.

C. Danfordiæ is more nearly allied to *C. chrysanthus* than to any other species, but it is readily distinguished by its exceptionally short spreading stigmata, and its very small pale yellow flowers. It is an early spring species, and flowers and seeds freely in cultivation. It appears to take the place of *C. chrysanthus* in the east of Asia Minor. Its recorded habitats are situated in longitude 37° east, and between 38° and 40° north latitude. If it occurs in Lycia its range of latitude would be between 30° and 37° east.

REFERENCES TO PLATE LXIII.

Fig. 1. Flowering-state, February 19th, from corms collected at Sivas, Asia Minor, actual size.
Fig. 1. *a* and *b*. Bronzed and white varieties, actual size.
Fig. 2. With matured leaves and capsules, May 17th, actual size.
Fig. 3. Diagrammatic dissection of scape, ovary, and spathes, actual size.
Fig. 4. Stamens and Pistil, magnified two-fold.
Fig. 5. Pollen Grain, magnified one hundred and fifty-fold.
Figs. 6 and 7. Stigmata, magnified six-fold.
Fig. 8. Section of leaf, magnified six-fold.
Fig. 9. Seed, June 8th, magnified six-fold.
Fig. 10. Corm tunics, magnified two-fold: *c*, main tunic; *d*. *e*, and *f*, basal tunic.

64. CROCUS SPECIOSUS.

Section: Nudiflori; parallelo-fibrosi *(Herbert)*: Schizostigma; autumnal *(Baker)*: Annulati (*G. Maw*).

Crocus speciosus, (not *C. speciosus* of Wilson in Engl. Bot. Suppl. tab. 2752, which is *C. nudiflorus*, Smith, not *C. speciosus*, Rchb., Ic. Crit. tab. 948, which is *C. iridiflorus*, Heuffel), M. Bieb., Fl. Taur. Cauc.; vol. i, p. 27, and vol. iii, p. 36; and Cent. pl. Ross. tab. 71; Bot. Reg. 1839, vol. xxv, tab. 40; Herbert in Bot. Mag. anno 1841, tab. 3861; and Hist. Crocus, sp. 40, p. 43; from Journ. Hort. Soc. Lond., vol. ii, p. 289; Boiss. and Buhse, Cat. Pl. in Nuov. Mem. Soc. Imp. Nat. Mosc. p. 210; Tchihatcheff, Asie Min., part iii, Bot., vol. ii, p. 520; Regel, Gartenflora tab. 379, fig. 1; Klatt, Revis. Irid. in Linnæa, vol. xxxiv, pp. 686 and 721; Baker, Rev. Sp. Crocus in Gard. Chron., new ser., 1873, p. 1633; List Crocus in Journ. R. Hort. Soc., new ser., vol. iv, 1877; and Syst. Iridac. in Journ. Linn. Soc., Bot., vol. xvi, p. 85; G. Maw, Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, p. 781; in The Garden, vol. xxi, num. 532, p. 70; and Hist. Crocus in Journ. Linn. Soc., Bot., vol. xix, p. 373; Boiss., Fl. Orient., vol. v, part i, p. 114.

C. multifidus, (not *C. multifidus*, Ramond, which is *C. nudiflorus*, Smith) Rchb., Ic. Crit. tab. 947, fig. 1275.

Cormus magnus, $\frac{3}{4}$—$\frac{1}{4}$ poll. (0.019—0.032 metr.) latus, et $\frac{3}{4}$ poll. (0.019 metr.) altus, basi bulbiferus. Tunica membranacea tenuior quam in ulla specie, annulata; tunica basalis, discus membranaceus, annulis 1—2 latis membranaceis. Vaginæ spatham superantes. Folia 2—4, hysteranthia, in vere pedalia (0.300 metr.) vel longiora $\frac{1}{4}$—$\frac{1}{3}$ poll. (0.0063—0.0084 metr.) lata, laminæ marginibus abrupte reflexis acutis; carina prominens, marginibus acutis recurvis, utrinque ciliatis. Spatha diphylla, vaginis tecta. Perianthium: faux glabra, alba; segmenta maxima, 2—$2\frac{1}{4}$ poll. (0.050—0.056 metr.) longa, $\frac{3}{4}$—1 poll. (0.019—0.025 metr.) lata, lata lanceolata, lilacina venis purpureis tribus verticalibus, retem purpuream extus formantibus, exteriora extus basi splendide purpurea. Antheræ aurantiacæ acuminatæ, ferme 1 poll. (0.025 metr.) longæ, quam filamenta alba duplo vel triplo longiores. Stylus ad apices antherarum fissus; stigmata aurantiaca antheras multo superantes, sæpius erecta, sed in formam Tiflisianam recurva. Semina magna, ferme sphærica, atro-rubra, papillosa.

Corm from three-quarters of an inch (0.019 metre) to an inch and a quarter (0.032 metre) broad and high, bearing bulbils or cormlets at its base. *Tunic* membranous, thinner than that of the other annulate species; *Basal Tunic* a membranous disc, succeeded upwards by two or three broad membranous annuli.

Sheathing Leaves four or five, from half an inch to three and a half inches (0.013—0.088 metre) in length, longer than, and enclosing the proper spathes and one or two scapes.

Proper Leaves three or four, barely half an inch (0.013 metre) long, and hidden within the sheathing leaves at the autumnal flowering-time, developed in the spring, and produced at the maturity of the capsule to a length of fourteen or fifteen inches (0.350—0.375 metre), from one-quarter to one-third of an inch (0.0063—0.0084 metre) broad, the keel about one-fourth the width of the blade, the lateral channels broad and open and without ridges, the margin of the keel and blade ciliated.

Perianth: Tube four inches in length (0.100 metre) from the ovary to the throat. *Throat* glabrous, white. *Segments* from two to two and a half inches (0.050—0.063 metre) long, and from three-quarters of an inch to an inch (0.019—0.025 metre) broad, bright lilac feathered with three main branching purple veins, which ramify over the entire surface; the inner segments much broader than the outer.

Stamens an inch high (0.025 metre); the orange *Anthers* three times the length of the white *Filament*. *Pollen Grain* papillose, orange, from $\frac{1}{400}$ to $\frac{1}{300}$ of an inch (0.00006—0.00008 metre) in diameter.

Pistil much exceeding the stamens, an inch and a half (0.038 metre) in height; the *Style* dividing at the level of the summit of the anthers, and produced into a mass of erect or drooping bright orange capillary stigmata.

Scape from half an inch to an inch and a half (0.013—0.038 metre) high at the flowering-time, produced to a height of from two to three inches (0.050—0.075 metre) at the maturity of the capsule.

Capsule from three-quarters of an inch to an inch and a quarter (0.019—0.032 metre) in height, and three-eighths of an inch (0.010 metre) broad.

Seed nearly globose, about one-ninth of an inch (0.0028 metre) in diameter, rich red brown, papillose; the chalaza, raphe, and caruncle a little darker than the body of the seed.

Crocus speciosus has an extended range from north Persia, through the eastern parts of Asia Minor, the Caucasus, and the Crimea, to the province of Podolia, in southern Russia. Herbert, followed by Baker, mentions its occurrence as far north-west as Transylvania; but I can find no authenticated record of its occurrence there, and I think it probable that Reichenbach's name of *speciosus* (Ic. Crit., tab. 948), applied to *C. iridiflorus*, which is a native of Transylvania, may have suggested its reputed occurrence in that region.

Its range, omitting Transylvania, would be between 29° and 55° east longitude, and 37° and 48° north latitude. Colonel O. St. John, writing from Kanchar, mentions an autumn-flowering Crocus as common in southern as well as northern Persia, and if, as is probable, he refers to this species, it may extend further south than 37° north latitude. The most eastern point from which it has been recorded is the neighbourhood of Astrabad; it is also common in the province of Karadagh, in north-west Persia. In Armenia it has been recorded from woods on the Tchater Dagh (? Tchildir Dagh, north of Kars); and I think the plant gathered by Kotschy on the summit of the Kolak Dagh, near Trebizond, at an altitude of eight thousand five hundred feet, November 6th, 1859, and distributed by him under the name of *C. pulchellus*, is this species.

In Georgia and the Caucasus it has been found at Tiflis; in the neighbourhood of Kutais, in the province of Imeritia; near Golovinskii; at Sukhum-Kale, in the

Fig. 2, Oct. 15th

Fig. 14, × 6.

Fig. 15, *e* × 2

Fig. 5 July.

Fig. 6
June 30th

CROCUS SPECIOSUS, *M. Bieb.*

J. Maw del

F. Huth, Lith^r Edin^r

province of Abkhasia; and on the mountains of Elburz, near the Rad Kan. It was found both by Steven and Nordmann near Simpheropol in the Crimea, and extends as far north-west as Nestouta, near Balta in the province of Podolia, southern Russia.

Crocus speciosus has been long in cultivation, though it is not so generally grown as its merits as a decorative plant would suggest. Its large, richly veined, purple flowers are freely produced through September and October, the leaves remaining dormant till the ensuing spring. It is one of the few species that is reproduced from small bulbils or cormlets growing from near the base of the corm.

REFERENCES TO PLATE LXIV.

Fig. 1. Flowering-state, Sept. 25th, actual size.
Fig. 2. Flowering-state, from Tiflis, October 15th, actual size.
Fig. 3. Inner surface of outer segment, actual size.
Fig. 4. Inner surface of inner segment, actual size.
Fig. 5. With matured leaves and capsule, from Tiflis, July 1st, actual size.
Fig. 6. With matured leaves and capsule, June 30th, actual size.
Fig. 7. Diagrammatic dissection of scape, ovary, and spathes, actual size: *b*. and *c*. from Tiflis.
Fig. 8. Stamens and Pistil, from Tiflis, magnified two-fold.
Fig. 9. Stamens and Pistil, magnified two-fold.
Figs. 10, and 11. Pollen Grains, magnified one hundred and fifty-fold: Fig. 10. from Tiflis.
Figs. 12, and 13. Stigmata, magnified six-fold; Fig. 12. from Tiflis.
Fig. 14. Section of leaf, magnified six-fold.
Fig. 15. *d*, *e*, and *f*. Basal Corm-tunic, magnified two-fold.
Fig. 16. Seeds, magnified six-fold.

The Bosphorus, from the Asiatic shore.

65. CROCUS PULCHELLUS.

Section: Nudiflori; parallelo-fibrosi (*Herbert*): Schizostigma; autumnal (*Baker*): Annulati (*G. Maw*).

Crocus pulchellus, Herbert, Croc. Synops. in Bot. Mag. 1841, sub tab. 3861-2; in Bot. Reg., vol. xxix, anno 1843, misc. p. 81, num. 126; and vol. xxx, anno 1844, tab. 3, fig. 1; and Hist. Crocus, sp. 41, p. 44; from Journ. Hort. Soc. Lond., vol. ii, p. 290; Griseb., Fl. Rumel., vol. ii, p. 547; Moore, Fl. Mag. 1850, vol. ii, p. 273, with figure; Tchihatcheff, Asie Min., part iii, Bot., vol. ii, p. 520; Klatt, Revis. Irid. in Linnæa, vol. xxxiv, pp. 688 and 721; Baker, Rev. Sp. Crocus in Gard Chron., new ser., 1873, p. 1633; List Crocus in Journ. R. Hort. Soc. Lond., new ser., vol. iv, 1877; and Syst. Iridac. in Journ. Linn. Soc., Bot., vol. xvi, p. 85; G. Maw in The Garden, vol. xiv, num. 364, p. 420, tab. cliii, fig. 9; and vol. xxi, num. 532, p. 70; Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, p. 781; and Hist. Crocus in Journ. Linn. Soc., Bot., vol. xix, p. 373; Boiss., Fl. Orient., vol. v, part i, p. 114.

C. speciosus, (not *C. speciosus*, M. Bieb.) Griseb. Spic. Fl. Rumel, vol. ii, p. 374.

C. multifidus (not *C. multifidus*, Ramond, which is *C. nudiflorus*, Smith) Noë exsic. in Herbaria.

C. constantinopolitanus, Hertodt, Crocologia, anno 1670, cap. 3, species tertia.

Cormus $\frac{3}{4}$ poll. (0.019 metr.) latus, $\frac{1}{2}$ poll. (0.013 metr.) altus. Tunica coriacea basi fissa, apice cuspidibus acutis munita; tunica basalis, 3-4 annuli coriacei cuspidibus acutis 15-16 in margine externo. Vaginæ spatham superantes. Folia hysteranthia, in vere 9-poll. (0.225 metr.) longa, $\frac{3}{16}$ poll. (0.0047 metr.) lata, glabra, carina prominente angusta concava. Spatha diphylla, $1\frac{1}{2}$ poll. (0.038 metr.) longa, in vaginis inclusa. Perianthium: faux glabra, aurantiaca; tubus 4 poll. (0.100 metr.), longus spatham et vaginis poll. 3 superans, segmenta lata ovato-lanceolata, $1\frac{1}{2}$ poll. (0.038 metr.) longa, $\frac{3}{4}$ poll. (0.019 metr.) lata, splendide cærulescenti-lilacina, exteriora extus concolora, intus lineis 5 atropurpureis angustis ramosis ornata. Flores rarius albi. Antheræ albæ, quam filamenta flava hispida duplo longiores. Stylus prope faucem fissus, stigmata aurantiaca 10—12 tenuia capillacea antheris æquantia. Semina globosa, rubra, papillosa.

Corm about half an inch (0.013 metre) high, and three-quarters of an inch (0.019 metre) broad. *Tunic* coriaceous; the *Basal Tunic* consisting of three or four coriaceous annuli, with fifteen or sixteen short pointed rays on their outer circumference.

Sheathing Leaves four or five, from half an inch (0.013 metre) to three and a half inches (0.088 metre) in length, exceeding and enclosing the proper spathes, and enclosing one or more scapes.

Proper Leaves four or five, half an inch (0.013 metre) long, dormant within the sheathing leaves at the autumnal flowering-time, and produced to a length of about ten inches (0.250 metre) at maturity, three-sixteenths of an inch (0.0047 metre) broad, glabrous; the concave keel one-fifth the width of the blade; the lateral channels wide and open.

Proper Spathe diphyllous, an inch and a half (0.038 metre) in length, falling short of, and hidden within, the sheathing leaves, the inner spathe ligulate, the outer tubular.

Perianth: Tube four or five inches (0.100—0.125 metre) in length from the ovary to the throat. *Throat* unbearded, orange. *Segments* broad, ovato-lanceolate, one and a half inches (0.038 metre) long, and three-quarters of an inch (0.019 metre) broad, bright bluish lilac, yellow towards the throat, or occasionally white, the inner surface marked with five dark purple narrow branching lines.

Stamens seven-eighths of an inch (0.022 metre) high; the white *Anthers* somewhat longer than the hairy orange *Filament*. *Pollen Grain* papilose, $\frac{1}{400}$ of an inch (0.00006 metre) in diameter, pale cream colour.

Pistil equalling the stamens, about seven-eighths of an inch (0.022 metre) high from the throat; the *Style* dividing below the level of the anthers, and produced into a compact bunch of finely divided, orange-scarlet, capillary stigmata.

Scape about an inch (0.025 metre) high at the flowering-time, produced to a height of two or three inches (0.050—0.075 metre) at the maturity of the capsule.

Capsule an inch (0.025 metre) high, and one-third of an inch (0.0084 metre) broad.

Seed globose, one-ninth of an inch (0.0028 metre) in diameter, papillose, rich orange-red; the chalaza, raphe, and caruncle of the same colour as the body of the seed.

Fig. 1, Oct 11th

Fig. 2, June 20th

CROCUS PULCHELLUS, *Herbert.*

C. constantinopolitanus, Herlodt of Jena. Anno 1670.

G. Maw del.

F Huth, Lith^r Edin^r

Crocus pulchellus is abundant in heathy places and woods in the environs of Constantinople on both sides of the Bosphorus, and has been found in the Forest of Belgrade; near the Sweet Waters; between Buyukderé and the Black Sea; and near Scutari. Herbert records its occurrence on Mount Athos; and I have gathered it in great abundance on Mount Olympus, above Broussa up to elevations of between three thousand and four thousand feet, but can find no authenticated records of its occurrence further east, as the specimens distributed by Kotschy from the Koulak Dagh, south of Trebizond, under the name of *pulchellus*, appear to be *C. speciosus*.

It ranges in latitude from 40° to 41½° north, and in longitude from 24° to 30° east, and occurs from near the sea level up to elevations of four thousand feet.

Although *C. pulchellus* appears to have been known to Hertodt, of Jena, as early as 1670, it was first described by Herbert, and separated by him from *C. speciosus*, with which previous writers had associated it.

It flowers from the early part of September up to November, and even into December; the leaves which are dormant at the flowering-time being developed in the early spring.

As an ornamental garden plant few Crocuses are more desirable or attractive. It is of robust habit, and a continuous flowerer throughout the autumn months. It reproduces itself from seed very freely.

REFERENCES TO PLATE LXV.

Fig. 1. Flowering-state, October 11th, actual size.
Fig. 1. *a*. Inner surface of segment, actual size.
Fig. 2. With matured leaves and capsule, June 20th, actual size.
Fig. 3. Diagrammatic dissection of scape, ovary, and spathes, and flower of the white variety, actual size.
Fig. 3. *b*. Inner surface of segment of the white variety, actual size.
Fig. 4. Stamens and Pistil, magnified two-fold.
Fig. 5. Pollen Grain, magnified one hundred and fifty-fold.
Fig. 6. Filament, magnified ten-fold.
Fig. 7. Stigmata, magnified six-fold.
Fig. 8. Section of leaf, magnified six-fold.
Fig. 9. Basal Corm-tunic, magnified six-fold.
Fig. 10. Seed, magnified six-fold.

DIVISION II.—NUDIFLORI. Continued.

Species without a basal spathe.

Section IV.—INTERTEXTI.

Corm tunic of platted or stranded fibres. Vernal; the leaves appearing with the flowers; the proper spathe diphyllous.

66. C. Fleischeri.
67. parviflorus.

66. CROCUS FLEISCHERI.

Section: Nudiflori; reticulati *(Herbert)*: Schizostigma; vernal *(Baker)*: Intertexti *(G. Maw)*.

Crocus Fleischeri, Gay in Féruss. Bull. Sc. Nat., vol. xi, anno 1827, p. 319 (219), and drawing Bibl. J. D. Hooker; Tchihatcheff, Asie Min., part iii, Bot., vol. ii, p. 523; Baker, Rev. Sp. Crocus in Gard. Chron., new ser., 1873, p. 680; in Bot. Mag. 1875, tab. 6176; List Crocus in Journ. R. Hort. Soc. Lond., new ser., vol. iv, 1877; and Syst. Iridac. in Journ. Linn. Soc., Bot., vol. xvi, p. 84; G. Maw in The Garden, vol. xiv, num. 364, p. 420, tab. cliii, fig. iv, and vol. xxi, num. 532, p. 70; Synops. Genus Crocus in Gard. Chron., vol. xvi, p. 782; and Hist. Crocus in Journ. Linn. Soc., Bot., vol. xix, p. 373; Boiss., Fl. Orient., vol. v, part i, p. 104.

C. Fleischerianus, Herbert, Hist. Crocus, sp. 31, p. 32; from Journ. Hort. Soc. Lond., vol. ii, p. 278; and drawing in Lindl. Libr. R. Hort. Soc. Lond.

C. smyrnensis, Poech, Enum. Pl. Ins. Cyp., p. 11.

C. minimus var. *major* (not *C. minimus*, D. C.), Presl, Bot. Bemerk., p. 116.

C. candidus (not *C. candidus*, Clarke), Boiss. Diag., ser. i, xiii, pp. 16-17.

C. penicillatus (not *C. lacteus penicillatus*, Sabine, which is a horticultural form of *C. aureus*, Sibth. and Smith), Steud. M.S.

Cormus aureus $\frac{2}{3}$ poll. (0.017 metr.) altus et latus, basi bulbiferus. Tunicæ fibri flavescenti-brunnei, tenues, in fasciculos verticales quasi intertexti; pileus fibris reticulatis confectus; tunica basalis fibris radiatis tenuibus haud ramosis confecta. Vaginæ quam spatha breviores. Folia præfloralia, et tunc flores superantia, matura pedalia (0.300 metr.) glabra, angustissima, $\frac{1}{30}$—$\frac{1}{24}$ poll. (0.0008—0.0010 metr.) lata. Spatha diphylla, valvulis æqualibus ligulatis. Perianthium: faux glabra flava; segmenta acuta lineari-lanceolata, 1—$1\frac{1}{4}$ poll. (0.025—0.032 metr.) longa, vix $\frac{1}{4}$ poll. (0.0063 metr.) lata, alba, exteriora extus lineis purpureis ad basin in faucem descendentibus, linea media ad apicem segmenti producta. Antheræ parvæ aurantiacæ filamentis gracilibus æquantes. Stylus prope faucem fissus, rami stigmatici tenues capillacei rubri, antheras multo superantes. Semina roseo-coccinea, matura atro-chocolatina.

Corm from half an inch to three-quarters of an inch (0.013—0.019 metre) high and broad, yellow, producing bulbils or cormlets at its base. *Tunic* of fine yellowish brown fibres arranged in vertical strands as though platted; the *Cap* of finely reticulated fibres; the *Basal Tunic* of fine, radiating, unbranched fibres.

Sheathing Leaves about five, from half an inch (0.013 metre) to three or four inches (0.075—0.100 metre) in length, falling short of the proper spathes.

Proper Leaves four or five, reaching above the flowers, and produced at maturity to about a foot (0.300 metre) in length, very narrow, from $\frac{1}{30}$ to $\frac{1}{24}$ of an inch (0.0008—0.0010 metre) in width, glabrous; the convex keel barely half the width of the blade; lateral channels without ridges.

Proper Spathe diphyllous, ligulate, about two inches (0.0050 metre) in length, reaching nearly to the throat.

Perianth: Tube about three inches (0.075 metre) in length. *Throat* unbearded, pale yellow. *Segments* acute, linear-lanceolate, from an inch to an inch and a quarter (0.025—0.032 metre) in length, and barely a quarter of an inch (0.0063 metre) broad, white, the outer surface of the outer segments and the tube veined with rich purple.

Stamens much shorter than the pistil, barely half an inch (0.013 metre) high; the yellow *Anthers* barely so long as the slender white *Filament*. *Pollen Grains* $\frac{1}{400}$ of an inch (0.00006 metre) in diameter, glabrous, orange.

Pistil exceeding the stamens, about three-quarters of an inch (0.019 metre) in height from the throat; the *Style* dividing near the throat, and produced into a branching mass of capillary, scarlet or orange stigmata.

Scape about two inches (0.050 metre) high at the flowering-time, produced to a height of three or four inches (0.075—0.100 metre) at the maturity of the capsule.

Capsule three-quarters of an inch (0.019 metre) high, and one-third of an inch (0.0084 metre) broad.

Seed about one-sixth of an inch (0.0042 metre) high, and one-tenth of an inch (0.0025 metre) broad, bright crimson, ripening to rich brown; the chalaza, raphe, and prominent caruncle of the same colour as the body of the seed.

The distribution of *Crocus Fleischeri* is somewhat remarkable, as with the exception of a single record of its occurrence in Lycia, where it was found by Professor Edward Forbes, it is only known to occur at the western extremity of Asia Minor, in the neighbourhood of Smyrna, and at the eastern extremity in the Cilician Taurus, between latitude 37° and 38½° north, and longitude 27½° and 35° east.

I have gathered it in several places on the Hippurite limestone plateau to the east of Smyrna, at low elevations between Taktale and Boudjah, and between Boudjah and Smyrna. It was found by Aucher-Eloy near the Cilician Gates; by Theo. Kotschy at Gullek Magara in the Taurus, at a height of six thousand four hundred feet; and by Mrs. Danford in the Cilician Taurus.

It is an early spring flowering species, and is remarkable for its yellow corm, its singular, stranded tunic, bright crimson seeds, and its exceptionally narrow leaves. Monsieur Boissier, in the absence of Clarke's specimen of *C. candidus*, erroneously associated it with that species, to which it is not nearly allied.

Crocus Fleischeri is best cultivated to advantage under the protection of a cold frame, as from its delicate habit and early flowering-time, it does not thrive in the open border.

CROCUS FLEISCHERI, *Gay.*

C. Fleischerianus, Herbert. C. smyrnensis, Poech. C. penicillatus, Stendel.

J. Maw del.

F. Huth Lith.ª Edin.ª

REFERENCES TO PLATE LXVI.

Fig. 1. Flowering-state, March 1st, actual size.
Fig. 2. With matured leaves and capsule, July 2nd, actual size.
Fig. 3. Diagrammatic dissection of scape, ovary, and spathes, actual size.
Fig. 4. *a*, *b*, *c*. Stamens and Pistil, magnified two-fold.
Fig. 5. Anther, magnified four-fold.
Fig. 6. Stigmata, magnified six-fold.
Fig. 7. Pollen Grain, magnified one hundred and fifty-fold.
Fig. 8. Section of leaf, magnified twelve-fold.
Fig. 9. Corm tunics, magnified two-fold: *d*, cap; *e*, main tunic; *f*, basal tunic.
Fig. 10. Portion of main tunic, magnified six-fold.
Fig. 11. Seed, magnified six-fold.

Beyaz Dagh and Castle of Anascha. (Anasha) Taurus.
From a drawing by C. G. Danford. Esq.

67. CROCUS PARVIFLORUS.

Section: Nudiflori; reticulati *(Herbert)*: Holostigma; vernal *(Baker)*: Intertexti *(G. Maw)*.

Crocus parviflorus, (not *C. parviflorus*, Rchb., which is a var. of *C. vernus*) Baker in Trimen's Journ. of Botany, new ser., vol. v, num. 165, pp. 265,-266; and Syst. Iridac. in Journ. Linn. Soc., Bot., vol. xvi, p. 82; G. Maw, Synops. Genus Crocus in Gard. Chron., new ser., vol. xvi, p. 782; in The Garden, vol. xxi, num. 532, p. 70; and Hist. Crocus in Journ. Linn. Soc., Bot., vol. xix, p. 373; Boiss., Fl. Orient., vol. v, part 1, p. 105.

Cormus $\frac{1}{8}$—$\frac{1}{2}$ poll. (0.0084—0.013 metr.) latus. Tunicæ fibri intertexti in fasciculis cuspidum fibrosorum $\frac{1}{4}$ poll. (0.0063 metr.) supra apicem cormi producti. Vaginæ quam spatha breviores, scapos 1—2 involventes. Folia glabra, 3—4, ad florationem 3 poll. (0.075 metr.) longa, floribus æquantia, angustissima, $\frac{1}{20}$ poll. (0.0013 metr.) lata. Spatha diphylla, quam faux $\frac{1}{2}$ poll. (0.013 metr.) brevior. Perianthium: faux haud barbata; segmenta lilacina concolora, ovato-lanceolata, minima, $\frac{1}{2}$—$\frac{5}{8}$ poll. (0.013—0.016 metr.) longa, $\frac{1}{5}$ poll. (0.005 metr.) lata. Antheræ pallide aurantiacæ, $\frac{3}{8}$ poll. (0.010 metr.) longæ, filamentis duplo longiores. Stylus ad basin antherarum fissus. Stigmata integra subulata patentia, medio antherarum æquantia. Capsula et semina ignota.

Corm from a third of an inch to half an inch (0.0084—0.013 metre) broad, and from half an inch to two-thirds of an inch (0.013—0.017 metre) high. *Tunic* of stranded or interlacing platted fibres.

Sheathing Leaves about three, from half an inch to two inches (0.013—0.050 metre) long, shorter than the proper spathes, and containing one or more scapes.

Proper Leaves about four, three inches (0.075 metre) long, and reaching to the throat at the flowering-time, $\frac{1}{20}$ of an inch (0.0013 metre) broad, glabrous.

Proper Spathe diphyllous, an inch and a half (0.038 metre) in length, reaching to within half an inch of the throat, the inner spathe ligulate, the outer tubular.

Perianth: Tube an inch and three-quarters to two inches (0.044—0.050 metre) in length. *Throat* unbearded (?). *Segments* ovato-lanceolate, from half an inch to five-eighths of an inch (0.013—0.016) metre long, and one-fifth of an inch (0.005 metre) broad, uniform pale lilac or white.

Stamens exceeding the pistil, half an inch (0.013 metre) high; the yellow *Anthers* about twice the length of the *Filament*.

Pistil about three-eighths of an inch (0.010 metre) high from the throat; the *Style* dividing at the level of the base of the anthers, and shortly produced into entire, spreading, yellow stigmata, which reach to the level of the middle of the anthers.

Capsule and *Seed* unknown.

Crocus parviflorus was discovered by Mrs. Danford in the spring of 1876, in fir woods, at an altitude of about four thousand feet, near the village of Anascha in the Cilician Taurus, latitude 37° 20′ north, longitude 34° 40′ east, flowering from the middle of March to the middle of April. The unique specimens in the Kew Herbarium, forming the subject of my figure, were collected by her on a steep, earthy slope, about a mile to the south-west of Anascha.

Crocus parviflorus, is about the smallest of the genus, and has no near ally. Its singular stranded corm tunic resembles that of *C. Fleischeri*, though a little coarser in texture; beyond this the two species of the division *Intertexti* possess scarcely any other character in common.

C. parviflorus has not yet been introduced to cultivation.

REFERENCES TO PLATE LXVII.

Fig. 1. Flowering-state, March, actual size.
Fig. 2. Diagrammatic dissection of scape, ovary, and spathes, actual size.
Fig. 3. Stamens and Pistil, magnified two-fold.
Fig. 4. Pistil, magnified six-fold.
Fig. 5. Corm-tunic, magnified two-fold.
Fig. 6. Portion of Corm-tunic, magnified about twelve-fold.

Fig. 1, March & April.

CROCUS PARVIFLORUS, *Baker.*

G. Maw del.

F. Huth, Lith^r Edin^r

APPENDIX

ON THE

ETYMOLOGY OF THE WORDS CROCUS AND SAFFRON.

By C. C. Lacaita, M.A., M.P., F.L.S.

The two names 'Crocus and Saffron,' with their cognate forms, are of such antiquity, and of such wide distribution, as to merit some inquiry into their history, which, in the case of 'Crocus' at least, is very obscure.

From Great Britain to the farthest parts of India, one or other of these names, and often both, are used to signify the plant *Crocus sativus*, L., and the Saffron obtained from it. Usually they are employed for plant and drug indiscriminately; in England at present there seems to be a tendency to confine 'Saffron' to the drug and 'Crocus' to the plant.

In the dead languages 'Crocus' and its allied forms alone occur; modern Eastern languages usually possess both, but 'Saffron,' of Arabic origin, is more usually and widely employed; in modern European languages 'Saffron' has almost altogether supplanted 'Crocus,' except in Gaelic and English. Even in England 'Crocus,' borrowed immediately from the Latin, has only become of common use as a gardener's word, from the universal cultivation of various species as ornamental flowers. In older English 'Saffron' was the common name both of plant and drug, 'Crocus' being only a literary word. As such it is used by Milton; and Holinshed,* in his account of the cultivation of Saffron in England, speaks of "the young gentleman Crocus" of Ovid's Metamorphoses. Holinshed was acquainted with the source from which both 'Crocus' and 'Saffron' come; he says, "the whole herbe is named in Greeke *crocos:* yet in the Arabian speech (from whence we borrow the name we give thereunto) I find that it is called Zahafaran." In the same passage he speaks of "our crokers or saffron men." Professor Skeat thinks that this curious word is probably an abridgment for 'Crocusers.'

The word 'Saffron' offers no difficulty. With slight modifications it is found in all, or almost all European and in several Oriental languages, always with the same meaning, viz., the plant *Crocus sativus*, or the dyestuff made from the plant. In all

* *England*, iii, 8.

the languages in which it occurs it has been borrowed directly or indirectly from the Arabic زعفران *za'ferān*. The ultimate origin of this Arabic word is unknown; De Candolle* suggests that it may be derived from أصفر *assfar*, 'yellow'; but this derivation is untenable, failing to account for the presence in the word *za'ferān* of the peculiar guttural ع (Ain) before the *f*; moreover, the *z* (as in English *zone*) is a totally different sound from the hard *s* (harder than in English *ass*).† In adopting this word, the Oriental languages which employ the Arabic character usually, though not invariably, adopt the Arabic spelling as well; but in actual pronunciation they altogether drop the guttural Ain, and often slightly modify the rest of the word, usually substituting some other sibilant for the *z*. European languages always omit the guttural, and variously modify the rest of the sounds. The following list does not profess to be exhaustive:—

PERSIAN. زعفران *za'ferān*. The ع not pronounced.

HINDUSTANI. زعفران *za'ferān*. The Bengali and Hindi pronunciation is *jafran*.

MALAY. سفارون *safārūn*.‡

TURKISH. زعفران *za'ferān*, and صفران *safrān*; in either case pronounced *safran*, with both *a*'s broad, as in English *wall* or *war*.

MEDIÆVAL GREEK. Ζαφαράς, *zapharás*; ζαφρᾶς, *zaphrâs*, and ζαφορά, *zaphorá*; though all these words seem to have applied confusedly to Safflower as well as to Saffron.§

MODERN GREEK. σαφράνι, *saphráni*.

RUSSIAN. Шафранъ, *shafran*.

SERVIAN. Шафран, *shafran*.

POLISH. *Szafran*.

ILLYRIAN. *Çjafran*, or *Šavran* and *Xufran*.‖

HUNGARIAN. *Sáfrány*.

ROUMANIAN. *Șafranu*.

LOW LATIN. *Zafaranum*, *zaffaranum*, *zafranum*, *zaffranum*, and *zaframen*, but this last form is thought by Du Cange to be a copyist's error for *zafranum*.

ITALIAN. *Zafferano* and *zaffrone*.

SPANISH. *Azafran*.

PORTUGUESE. *Açafraõ*. The Spanish and Portuguese show an initial *a*, because they adopted the Arabic word preceded by the definite article, الزعفران *az-za'ferān*.

CATALAN. *Safrá*.

FRENCH. *Safran*, formerly often *saffran*.

BRETON. *Safron*.

WELSH. *Safrwn*, *saffrwm*, *safryn*, *saffr*.

GERMAN. *Safran*, *saffran*.

DANISH. *Saffran*.

SWEDISH. *Safran*.

DUTCH. *Saffraan*.

ENGLISH. *Saffron*. In Old English the word is variously spelt; *e.g.*, *saffron*, *safroun*, *safforne*.

---

* *Origin of Cultivated Plants*, p. 166.

† Littré, *sub voce* '*Safran*,' has, "l'arabe *az-zaferān*, qui vient du Persan *zaāfer*"; but this is an error, *zaāfer* being the Arabic plural of *za'ferān*.

‡ Ainslie, *Materia Indica*, *sub voce* '*Saffron*.'

§ Du Cange, *Glossarium mediæ et infimæ Græcitatis*.

‖ Visiani, *Flora Dalmatica*, iii, 121.

Much more obscure is the history of 'Crocus,' whose ultimate origin is lost in the dimness of distance. The word appears in different languages under the following disguises :—

HEBREW. כַּרְכֹּם, *Karkōm.*

CHALDEE. כָּרְכָּם, *Kurkām*, or כּוּרְכַם *Kūrkam*, and כָּרְכְּמָא *Kurkămā*, or כּוּרְכְּמָא *Kūrkămā.*

SYRIAC. ܟܘܪܟܡܐ *Kūrkamā.*

ARMENIAN. Խրխում *Khkhurum.*

ARABIC. كُرْكُم *Kurkum.**

PERSIAN. كُرْكُم *Kurkum*, كَرْكُم *Karkum*, and كَرَكَم *Karkam*,† and also كُمْكُم *Kumkum.*‡

SANSKRIT. कुङ्कुम *Kuṅkuma.*

HINDUSTANI. कुङ्कुम كُنْكُم *Kuṅkum*, or कुमकुम كُمْكُم *Kumkum.*

KASHMIRI. *Kong.*§

TAMIL. குங்குமம் *Kuṅkumam*, and with the addition of பூ *pū*, 'flower,' குங்குமப்பூ *Kuṅkumappū.*‖

GREEK. Κρόκος *krókos.*

LATIN. *Crocus* and *crocum.*

ITALIAN. *Croco* (literary), *grogo* or *gruogo* (local).

GAELIC. *Croch.*

IRISH. cróċ or crón.

All the Eastern words in this list fall at once into two groups, according to the consonants which appear in them. Those of the first group always show the consonants KRKM. They occur in Hebrew, Chaldee, Syriac, Arabic, Armenian, and Persian, and obviously are merely different forms of the same word. Those of the second group are just as obviously different forms of one word. They replace the R by N or M, thus showing the sequence of consonants $K^{N}_{M}KM$,¶ which occurs in Persian, Sanskrit, and modern Indian languages allied to Sanskrit, as well as in some other Indian languages, which, although not related to Sanskrit,

---

* Also signifies Turmeric.

† See Haft Kulzum ; the last form, *karkam*, also means a rainbow. Lagarde, *Gesammelte Abhandlungen*, p. 58, believes that the pronunciation *kurkum* alone was ever used in the sense of Saffron.

‡ See *Burhān i Kāti.*

§ Elmslie, *Kashmīrī Vocabulary*, 1872, p. 159, and Stewart, *Punjab Plants*, p. 239, give *kóng* or *kongs* as the vernacular for *Crocus sativus.* Neither of them give the word in any Oriental character, but there can be little doubt of its connection with Sanskrit *kuṅkuma.* Mr. Downes, Medical Missionary in Kasmir, whilst writing *kong*, has sent the word to Mr. Maw written in Persian character as كُنْگ which would read *kung* in the system of transliteration I have here adopted. I have been unable to find any explanation of the *s* in the form *kongs.* Dr. Elmslie in his preface observes, "the language as now spoken has not been reduced to writing," and in his "Directions for Reading," says that both *o* and *ó* are to be sounded as the *o* in the English word *mote.*

‖ Winslow, *Tamil Dict.*, p. 804, gives 'European Saffron' as the equivalent of the last word ; whence it would seem that in this combination *pū*, flower, is used in the figurative sense of excellence, and not literally of the flower of *Crocus sativus.*

¶ The Kashmiri *kong* does not affect the argument, for it is either a truncated form, or corruption, of the Sanskrit *kuṅkuma ;* or else is a completely independent name for 'Saffron,' not referable at all to this group of words.

have borrowed this particular word. It is noticeable that in Persian, and Persian alone, are found words both of the KRKM and of the $K^{N}_{M}KM$ type. And this is what we should expect, for Persia is the geographical borderland between the two groups, and in a sense the philological borderland as well, owing to the enormous number of Semitic words in the Persian vocabulary.

It has been assumed by various German scholars (*e.g.*, Fürst, Weber, Löw, &c.), and, seeing that the change of R into a nasal N or M offers no philological impossibility,* it appears probable that the KRKM and $K^{N}_{M}KM$ types are not of independent origin, but whichever was first used was imported together with the dye it signified, and altered into the other, either in the mouths of the carrying merchants, or of the races who received both word and dye as foreign goods.

Crocus is a Latin word borrowed by us in its Latin form without any alteration, as the Latin itself is borrowed from the Greek,† and the Greeks in turn received their *Krókos*, κρόκος, from some Semitic tongue. All inquiry into the history of these words is much complicated by the constant confusion which has been made between three totally distinct plants, whose only resemblance is that all three produce somewhat similar yellow dyes or drugs. As this confusion appears in their very names, and will make constant reference to all three plants necessary, it will be well to distinguish them at once. They are: (A.) *Crocus sativus*, L., Saffron. The yellow dye-stuff is obtained from the styles and stigmata, often adulterated with the stamens of the flower. As in the case of almost all plants which have been cultivated from very ancient times, no form exactly identical with that found in cultivation is known anywhere in a wild state, but the five truly wild so-called 'species,' so nearly allied to it as to be grouped by Mr. Maw as varieties of *C. sativus*,‡ range through 35° of longitude, from the Abbruzzi in central Italy through south-eastern Italy, Dalmatia, Greece, the Crimea and Asia Minor to Kurdistan. It is not improbable that other closely-allied wild forms may yet be found in the little-known regions of Persia, Turkestan, and Northern Afghanistan. No species of the genus *Crocus* is indigenous to India or the Himalayas, to Arabia, or to Egypt.

---

* The following instance of the change of *rk* into m*k*, extracted from Beames' *Comparative Grammar of the Modern Aryan Languages of India*, i, 318, may shed some light on the point, although not strictly parallel, as the Sanskrit *kuṅkuma* already contains the nasal, and the laws of change in affiliated and cognate languages do not apply to the mispronunciations which often cause words adopted from foreign languages to be altered in the process. Sanskrit कर्कट, *karkata*, 'a crab'; Prakrit कक्कडो, *kakkado*; Hindi केंकडा, *kemkadā*; Sindhi कांकिडो, *kāmkido*; Oriya and Bengali कांकडा, *kāmkadā*.

† As to the origin of the less usual Latin form *crocum*, see below.

‡ *C. sativus Cashmerianus*, Royle, is merely the plant cultivated in Kashmir. Royle, *Ill. Himal.*, p. 371.

The cultivation of *Crocus sativus* has a much wider range, extending with intervals from England* along the Mediterranean basin, Asia Minor and Persia to Kashmir. It seems to be sporadically grown in China, where the use of Saffron is of comparatively modern introduction,† and is probably cultivated in some parts of Thibet. But it is not grown in India, except quite locally in Kashmir, nor in Arabia, nor in Egypt, and we have no evidence that it was ever grown in any of these countries. This cultivated form must have originated in very early times from one or more of the allied wild forms which are found east of the Adriatic, the Italian plants having generally shorter stigmata.‡

(B.) *Carthamus tinctorius*, L., Safflower,§ or bastard Saffron. German, *saflor*. Spanish, *alazor*. Greek, *knēkos* (κνῆκος), whence the Latin *cnicus;* but both terms were probably generic terms for thistles.

Sanskrit, *Kusumbha*, कुसुम्भ, with cognate names in the modern Aryan languages of India.

Arabic, *qurṭum*, قُرْطُم whence the mediæval Greek κουρδοῦμ, cited by Du Cange, and the botanical Latin *Carthamus;* also *'usfur*, عُصْفُر and some other less usual names.

This plant is a thistly composite, more unlike a Crocus than a Crocus is unlike a rose. The red or yellow dye is obtained from the bright orange florets, and the seeds yield oil. It has long been cultivated in Egypt,‖ Northern India, and other countries in the latitude of Egypt and the Southern Mediterranean, but no botanist has yet found the plant in a really wild state. De Candolle¶ plausibly argues that it may be indigenous in some of the little known parts of Arabia. The dried florets are very like the Saffron of the market, and have been commonly employed to adulterate it. Safflower is, according to Drury's *Useful Plants of India*, p. 116, the *Crocus Indicus* of Rumphius, although not 'Indian Saffron.' This name of *C. Indicus*, like the use of 'Indian Saffron' for Turmeric, has misled lexicographers.**

(C.) *Curcuma longa*, Roxb. (*Amomum curcuma*, Gmel.), Turmeric†† or Indian Saffron. German, *Gilbwurz*.

---

* Saffron-Walden in Essex takes its name from the Saffron formerly grown there on a large scale; *see* Fuller's *Worthies*, Essex.

† *See* Chapter VI.

‡ The Italian wild forms can be, and occasionally are, locally used for their Saffron.

§ The derivation of this word has not been traced. Hehn, *Kulturpflanzen*, p. 271, edition, 1877, attempts to trace it through an Italian *asforo* and *asfiori*, whose existence I have not verified, to the Arabic *'usfur* عُصْفُر but until this etymology is better supported, it will be safer to consider the word a mere variant of Saffron, the dyes having been much confused.

‖ The grave cloths of the mummies are dyed with it. De Candolle, *Origin of Cultivated Plants*, p. 164.

¶ *Ubi supra.*

** *See* Note to page viii.

†† "Turmeric is a gross corruption of the French name terremérite, from the low Latin 'terra merita,' which itself is probably a barbarous corruption."—*Skeat.*

Sanskrit. हरिद्रा *haridrā.**

Hindustani. हलदी هَلْدي *haldī.*

Persian. زَرْدچُوبْ *zerd-chūb* (literally, yellow wood), and هُرْدْ *hurd.*

Arabic. هُرْدْ *hurd*, and كُرْكُمْ *kurkum.*

Syriac. ܥܩܪ ܟܘܪܟܡܐ *'aqār kūrkamā*, i.e., *kūrkamā* roots.†

The mediæval Greek κούρκουμ,‡ and the low Latin *Curcuma*, which has been adopted as the botanical name of the genus, are simply the Arabic word adapted to the Greek and Latin alphabets.

This plant, of the order *Scitamineæ*, is no more like a Crocus than *Carthamus tinctorius* is like one. It is figured by Redouté, *Liliaceæ*, vol. viii, tab. 473. Some of the other species of *Curcuma* are showy. They are handsomely figured in Roscoe's *Scitamineæ*, tabb. 99 to 109. For those who may not have seen the plant or the figures, the following description of the habit of the genus *Curcuma*§ may be of use. "The rhizome is thick and provided with tuber-bearing fibres. The stems erect, 1 to 10 feet high. Leaves often large. Flowers arranged in a very dense, strobiliform (top-shaped), oblong or elongated thyrsus, furnished with ample imbricated bracts, which are concave or hooded and rounded at the apex, the upper bracts often empty, coloured and beautifully comose (tufted). In *C. longa* the flowers are large, whitish with a faint tinge of yellow, and the tuft and bracts greenish-white. The dye or drug is obtained from the palmate tubers, which are inwardly of a deep orange colour."

More than thirty species of *Curcuma* have been enumerated, mostly natives of tropical Asia, though some extend to tropical Africa, the islands of the Pacific, and the northern extremity of Australia. Several species are cultivated and have been spread beyond their indigenous area. Thus *C. longa* is commonly grown in many parts of India, where Turmeric is largely used as a dye, medicine, or seasoner. It is also grown and used in Madagascar;‖ and in the latter part of the last century Forsk l found it in cultivation in Yemen¶ under the name of *kurkum*. There is no evidence that its cultivation ever spread farther. The Spanish-Arabian writers on

* This is a compound word, literally signifying yellow-wood; the Prakrit forms are हलद्दा *haladdā*, and हलद्दी *haladdī*, whence the Hindi हलदी *haldī*, vulgarly *hald*. Platt's *Hindustani Dictionary*, p. 1231.

† Löw, *Aramäische Pflanzennamen*, p. 219.

‡ Du Cange.

§ Translated from Bentham and Hooker, *Gen. Plant.*, iii, p. 643.

‖ Exempl. in Herb. Kew.

¶ Forskål, *Flora Ægyptiaco-Arabica*, pp. 92, 102.

Materia Medica, to whom Yemen was a distant and rather mysterious land, confused it with other roots which give a yellow dye, very possibly with other species of *Curcuma*, e.g., *Curcuma zedoaria*, Roscoe.

Confusion between the three drugs just discussed was most natural to those who only knew them, or some of them, as drugs or dyes. It would be impossible where all three plants were cultivated. And in practice the Arabians never seem to have confounded the Safflower, so largely grown in Egypt, with any other plant. It is round the foreign Turmeric that their difficulties collected; but in Europe, where Safflower is only very sparingly grown in the Mediterranean region, and Turmeric not at all, we find the confusion indicated by the very names Saffron, Safflower, Saflor, Indian Saffron, bastard Saffron.

In India the names seem to have been kept pretty clear, both Safflower and Turmeric being commonly grown there. The name *kunkuma* and its congeners are never used of either of them, but confined to the true Saffron; on the other hand, a large number of Sanskrit words, adjectival in form, are applied to all three plants, or to some two of them alike; but on examination these prove to be not strictly plant names, but rather titles descriptive of the colour, brilliancy or excellence of the dye or drug.

There is little doubt that *crocus* and *curcuma*, *krókos* and *kurkum*, are variants of the same word, and both descendants of the Hebrew *karkōm*, כַּרְכֹּם,* or of some similar but now lost word in the language of the Phœnicians, which may well have been of some such form as *krōkhom*, כְּרֹכֹם, as Dr. Fürst assumes to have been the case.† Yet it is well to remember that the actual use of such a form among the Phœnicians is no more than probable; no such word has as yet been found among the scanty remains of their speech which have been preserved to us. If indeed such a form as *krōkhom* was actually in the mouths of the merchants and sailors who brought Saffron to the West, it is difficult not to suppose that the Latin *crocum*‡ was that very form repeated by those whose ears heard its sound, whereas the commoner *crocus*, which alone occurs in the poets, came indirectly through the Greek *krókos*, and was preferred by the scholarly writers through whose works we know classical Latin.

---

* Song of Solomon, iv, 14.

† *Hebrew and Chaldee Lexicon*, sub voce. In the Hebrew *karkōm*, the tone is on the second syllable; in the Greek *krókos*, on the first. In Davidson's *Fürst* the Phœnician form is assumed to have been כְּרֹכֹם, given in Latin letters as *crocom*; this transliteration involves the further assumption that in the Phœnician word the tone was on the first syllable, otherwise the vowel in the second must be *ā*, and not *ŏ*.

‡ Pliny, xxi, 6-17; Sallust, H, i, 80; Celsius v, 11.

So far it is immaterial whether *karkōm*, כַּרְכֹּם in the Song of Solomon really means 'Saffron' or 'Turmeric'; immaterial too which plant originally bore the name. But both these questions face us as soon as we attempt to go any further into the matter, and both are mixed up with the third question, whether the word *karkōm* itself was not imported from India as a loan-word from Sanskrit? The answer given to this last question by those* who have attempted to answer it has often been that *karkōm* the word did come from India, being the Sanskrit *kuṅkuma*, कुङ्कुम. They have often added that *karkōm* the plant or dye also came from India; but not keeping constantly before them the difference between Saffron and Turmeric, have failed to make it clear whether they mean that Saffron, or that Turmeric, or that both plants or dyes were introduced from India.†

What follows is an attempt to show: First, that 'Turmeric' was introduced from India, but was probably called *kurkum*, كُرْكُم, which has never been its name there, from the likeness of the dye it affords to the Saffron which already bore the name *kurkum*.

Secondly, that Saffron, far from having come from India, has never even been commonly cultivated there, except in a small part of Kashmir, and that the Saffron of the market, so much used in India, always was, as it now is, imported into the country, and not exported from it.

Thirdly, that the word *karkōm*, כַּרְכֹּם, did not come from India, but that, if it be indeed identical with the Sanskrit *kuṅkuma*, it was introduced into that language from some language of Western Asia; and that in the Song of Solomon, iv, 14,

---

* Fürst, *Lexicon, Hebrew and Chaldee, sub voce*, כַּרְכֹּם; Weber, *Hindu Pronunciation of Greek Words, and Greek Pronunciation of Hindu Words*, translated in the *Indian Antiquary* for May, 1873. In his list of Sanskrit words introduced into Greece through Phœnicio-Babylonian commercial intercourse, he includes *kuṅkuma*, כרכם, *Curcuma krókos*, but gives no evidence which touches this particular word.

† The hopeless confusion made by the lexicographers between Saffron and Turmeric sufficiently appears from the following quotations. Perhaps it is too much to expect that the botany of scholars should be any better than the notorious scholarship of botanists. The English translators of Gesenius seem to have supposed that 'Indian Saffron' and '*Crocus Indicus*' were a kind of *crocus!* "כַּרְכֹּם, Crocus, Saffron, both the common plants, and also *Crocus Indicus* or Indian Saffron."—Robinson's *Gesenius*, p. 495. כַּרְכֹּם, *Curcuma, Crocus Indicus*, the Crocus whether the Indian or the common."—Tregelles' *Gesenius*, p. 414. It has been rightly pointed out by Löw (*Aramäische Pflanzennamen*, p. 220), that in order to make sense of the passage in Gesenius it must be corrected to "כַּרְכֹּם, *Curcuma longa*, Turmeric, or *Crocus sativus*, Saffron," thus clearly stating the two alternative interpretations of the word which are possible. The corresponding passage in Fürst's *Hebrew and Chaldee Lexicon*, by Davidson, p. 697, though fuller and more imaginative, is no less confused. It is as follows: "כַּרְכֹּם, Indian Saffron, Crocus, Turmeric; originally a dye-stuff, then sweet-smelling water, ointment, oil, &c., prepared from it. Song of Solomon, iv, 14. (Here follow the Chaldee, Armenian and Arabic forms of the word.) The word, like the plant, came from India. The Sanskrit *kankuma* (*sic*), *Crocus sativus*, was changed among the Phœnicians into כַּרְכֹּם, *carcom*, and כְּרֻכָּם, *crocom*, out of which has arisen the Greek κρόκος."

the balance of probabilities is in favour of the meaning Saffron rather than of the meaning Turmeric. Whether the word was originally an old Persian name, borrowed by the Semitic races on the one hand, and by the Indians on the other; or a Semitic word borrowed by the Persians, and by them handed on to the Indians, it is useless to enquire in the absence of evidence on the point.

First then as to Turmeric. We have seen that the home of this plant is the Indian Peninsula and islands, where it is known by various names, but never by the name of *kuṅkuma*, or any of the other forms assumed by that name, nor by the name *kurkum* which it bears in Arabic. Now although the Arabian writers on *Materia Medica* seem to have occasionally confused the Turmeric with other plants of foreign origin whose roots afforded yellow dye-stuffs, especially the *Chelidonium* of Dioscorides, which is probably the *Chelidonium majus*, L., the plant from Yemen, known to them by the name of *Wers*, ورس, and the plant they called *Māmīrān*, ماميران, which cannot be identified with any certainty, the following passages show pretty conclusively that some at least of them knew not only where the Turmeric came from, but how it came by its name *kurkum*. "The roots of this plant, called *kurkum* كركم, are known amongst us at the present day, and come from India. The Persians call these roots *Hurd* هرد." *

Again: "The Persians call these roots *Hurd*, and the inhabitants of Bassora call them *kurkum*, and *kurkum* is the Saffron. They give the name of Saffron to this plant because it dyes yellow in like manner as the Saffron. They bring these roots from certain islands of India and from Yemen."†

Tallying as they do with the probabilities suggested by the actual geographical distribution of the plants, and by the great antiquity, so far as regards the evidence we have from surviving literature, of the words *karkōm* and κρόκος, as compared with the words *kurkum* and *kuṅkuma*,‡ the passages just quoted need no comment. And

---

* *Elgāfiki apud Ibn Baiṭar* in Sontheimer's German translation, ii, 370. Abu Muhammed Abdallah Ben Ahmed, known as Ibn Baiṭar, the greatest of the Arabian botanists, was born at Malaga, and visited Egypt, Greece, Asia Minor and Damascus, where he died suddenly in November, 1248 A.D. His *Book of Simples* (*Corpus simplicia medicamentorum et ciborum continens*) has been translated into German by Sontheimer. From this translation I am obliged to translate, although Löw calls it "unzuverlässig (*Aramäische Pflanzennamen*, Introduction, p. 27). In this work, which is alphabetically arranged, the author sets out the passages of Dioscorides and Galen which relate to the plant under discussion, and gives copious citations from earlier Arabian and Persian writers. Abu Jafer Ahmed Ben Muhammed Ben Ahmed Ben Sayyid el Gāfiki, in his day the most learned physician in Spain, died in the year 1164 A.D.

† *Ibn Hassan apud Ibn Baiṭar, ubi supra.* The words "and from Yemen" introduce a confusion with *Wers*, which is the plant from Yemen. Abu Dawud Suleiman Ben Hassān Ibn Juljul, here referred to as Ibn Hassān, was a Spanish physician who flourished about 970–1000 A.D.

‡ *See* below.

if they really are supported by the MS. original, they prove conclusively that *kurkum* meant Saffron before it meant Turmeric, and that when Turmeric travelled from India to the Arabians, it did not come under one of its Indian names, but picked up on its way one of the names of Saffron owing to the likeness of the two dyes. That then among the Arabians the meaning Turmeric should have superseded (although not entirely),* the meaning Saffron is not to be wondered at, seeing that they had the word *za'ferān* set apart to signify Saffron.

Secondly, the Saffron itself, as we have seen, is not indigenous to India, and, although largely used there as a condiment, is not cultivated except in one small district of Kashmir, the plain of Pampur, whence it is exported, both north to Yarkand and south to Hindustan.† It is also largely imported through Afghanistan, and said to come from Persia. This is no new course of trade; the Sanskrit medical glossary, *Bhāvaprakāśa*,‡ tells us how Saffron (*kunkuma*) was imported; the best quality from Kashmir, the next from Balkh, and the third best from Persia.

The words काश्मीरजं, *kaśmīraja*m, and वाह्लिकं, *vāhlika*m, meaning literally 'the Kashmir thing,' and 'the Balkh thing,' are Sanskrit names for Saffron.§

Thirdly, we come to the word *karkōm*. Let us consider the comparative age of the writings in which the words have been preserved. First comes *karkōm*, כַּרְכֹּם itself in the Song of Solomon, iv, 14, 1000 years before the Christian era.‖ There it occurs in a context which shows it to have been the name of a scent or spice, but sheds no further light upon its meaning. As it occurs but this once in Hebrew literature, there is really no clue whatever to its meaning, except its resemblance to the other names of the KRKM group, and the words by which it has been rendered in the early translations of the Hebrew Scriptures, and in the Chaldee paraphrases. Next in time comes the Greek κρόκος, which occurs in Homer, and frequently in subsequent Greek literature. Now the latest possible date to assign to the Iliad, where the flower κρόκος, as well as the 'Saffron-veiled morn,' are spoken of,¶ is 550 B.C., the time of the Peisistratid recension. More

* *Kurkum* is given as one of the synonyms for *za'ferān* by Ibn Baiṭar, i, 530, citing the Hāwi of Rhazes. The Persian Muhammed Ben Zakarya Abu Bekr Alrāzi died A.D. 923–942 at a great age. Wüstenfeld enumerates the titles of 201 of his medical treatises.

† Royle, *Illustr. Himal.*, p. 371, and *Observations on the Vegetation of Afghanistan, Kashmir and Thibet*, p. 20; Stewart, *Punjab Plants*, p. 239; Elmslie, *Kashmīrī Vocabulary*, p. 159.

‡ *See* the passage printed *in extenso* in the *St. Petersburg Lexicon*, ii, 307, *sub voce* कुङ्कुम. The date of the *Bhāvaprakāśa* must be later than 1000 A.D.; *see* below as to the late date of the authorities for the Sanskrit word.

§ *See Williams'* and *St. Petersburg Lexicon, sub voce.*

‖ If we adopt Ewald's theory about the Song of Solomon, we shall still place it more than 900 years B.C.

¶ *See* below.

probably it is at least two hundred years older. Our next date is that of the Septuagint translation of the Hebrew Scriptures into Greek, made by Jews resident at Alexandria, about 300—275 B.C. The word *karkōm* is there rendered by κρόκος, which is therefore by far the earliest clue that we have to its meaning. Then come the earlier Latin writers, using *crocus* and *crocum*, shortly before the Christian era. They do not bear directly upon the meaning of *karkōm*, but in estimating the improbability of the word having come from India, it should not be forgotten that even the Latin writers using the word *crocus* are earlier than our Sanskrit authorities for the word *kunkuma*. At last, from one to six centuries after the Christian era* we come to the Aramaic words *kurkam*, כֻּרְכֻּם, *kūrkamā*, כּוּרְכְּמָא, &c., obviously identical with, and used to translate or explain the Hebrew *karkōm*. And here arises the first suspicion that *karkōm* might mean Turmeric, and not Saffron, for it is clear that these obscure Aramaic names, which are only intelligible through the Greek and Arabic renderings of them given in the old glossaries, sometimes signified Turmeric as well as Saffron. In Löw's *Aramäische Pflanzennamen*† these names, as well as those for Safflower, are most exhaustively treated, with the general result that they signify sometimes Saffron the drug, sometimes Saffron the plant or flower, sometimes Turmeric the drug.‡ What has already been said of the manner in which the Arabic name *kurkum* was transferred from Saffron to Turmeric, makes it quite intelligible that these Aramaic words should have been applied to both, if *karkōm* originally meant Saffron. But if it originally meant the obscurely-known Indian drug Turmeric,§ it is not easy to understand how it came to be applied to the common Saffron, plentiful in the Levant.

* M. Renan refers the most ancient Targums, those of Onkelos and Jonathan, to the second century after Christ, the Syriac Peshito version to the same century, the rest of Syriac literature to the fourth and later centuries, the Talmud of Jerusalem to the fourth, and that of Babylon to the fifth century. I believe 60 B.C. to be the earliest date now supposed to be possibly admissible for the Targum of Onkelos.

† Pp. 215–220: Leipzig, 1881.

‡ Dr. Löw seems to think, p. 215, that sometimes the words signify *Curcuma longa*, the *plant* which produces Turmeric, and that the Turmeric was then grown in Syria. This seems extremely improbable, for there was clearly great confusion between Saffron and Turmeric. No such confusion could possibly arise in a country where both *plants* were known, but only where one at least was only known in its market shape as a drug. Then at the end of his article, p. 220, Dr. Löw adds, "Auch des H. L. כַּרְכֹּם kann füglich nur die Indische Pflanze sein, nicht Crocus." I much regret that I fail to understand to what part of the preceding article or argument this conclusion "fügt sich," fits itself. The exhaustive citations, which show that some centuries after the Christian era the Aramaic words meant both Saffron and Turmeric, leave it an absolutely open question which was signified by the Hebrew word a long 1,000 years before. And Dr. Löw, so far as I can see, adds no argument of his own to connect the superadded conclusion with the citations. This is the more to be regretted, as his authority is so very convincing on such a point.

§ The Indian *plant* it cannot originally have meant, unless it be originally an Indian word, which if it be, it is the Sanskrit *kunkuma*, and that signifies not *Curcuma longa*, but *Crocus sativus*.

Latest of all are our authorities, for the Arabic *kurkum* and the Sanskrit *kuṅkuma*. Although Saffron is mentioned in Arabic literature before the time of Muhammed, the poet Nābiga Dhubyānī, speaking of *za'ferān* as an article of female toilet, a perfumed dye or ointment for the whole body, it is only in the medical literature of the centuries subsequent to the date of the Hegira (622 A.D.) that the word *kurkum* is met with. It is really upon the Arabian use of this word to signify Turmeric more commonly than Saffron, and upon the ambiguity of the Aramaic names, that is based the suspicion that the *karkōm* of the Song of Solomon means Turmeric. It has just been pointed out that this very ambiguity of the Aramaic words, so far as they are concerned, leaves the question absolutely open, or argues, if at all, in favour of Saffron; and the quotations from Ibn Baiṭar given above show that the Arabic meant Saffron before it meant Turmeric. But let us put them aside, and simply ask why the ambiguous Arabic representative of *karkōm* should be more decisive of its meaning than the Greek representative, which is just as clearly the same word, whose use to translate *karkōm* is 750 years, and whose earliest use is at least more that 1,000 years older, and which has the advantage of never being ambiguous, of always signifying Crocus, never *Curcuma*?*

We are now in a position to consider the statement that *karkōm* was borrowed from the Sanskrit *kuṅkuma*, the word having come from India. It must already be clear that this is only possible if *karkōm* means Saffron, that being the only meaning of *kuṅkuma*. Now that we have disposed of the imagination that the Saffron drug or plant was introduced from India, there remains no ground for supposing *karkōm* to have come from *kuṅkuma*, rather than *kuṅkuma* from *karkōm*, beyond the fact that Sanskrit is a very old language. But the word *kuṅkuma* has not been found in very old Sanskrit; it does not occur in Vedic literature, a silence which would be a little surprising as to the name of so noble and almost sacred a drug, had it been used there so early as to have been exported to Palestine before the time of Solomon, and to Greece before the date of the Homeric poems.

The passages where the word *kuṅkuma* occurs are collected in the St. Petersburg *Sanskrit Lexicon*, ii, 307, under कुङ्कुम. They are numerous, but are all cited from writings which, although of uncertain date, are undoubtedly far later than the Christian era, perhaps all more than 1,000 years later.

Therefore we may conclude with some probability that the word *karkōm* signified Saffron and not Turmeric, and with some certainty that it had its origin, not in Sanskrit, but in one of the languages, whether Semitic or not, of the region in which

* That the Greek poets and botanists may have used the word κρόκος of other species of the genus Crocus besides *Crocus sativus*, does not affect this argument.

the Saffron was first cultivated. If asked when this cultivation began, we can give no more definite answer than somewhere in the lands which stretch from Persia to Asia Minor, not in India or in Egypt.

Besides these widely-spread names, there occur a good many other words which are sometimes used of Saffron, flower or dye; most of them being also names of other objects, occasionally applied to Saffron from some sense of vague similarity. Mr. Redhouse has shown me nearly twenty Arabic words, said to be sometimes employed as synonyms for *za'ferān*. The list of equivalents for *kunkuma* given in Williams' *English-Sanskrit Lexicon* is almost as long. On examination, these all appear to be of adjectival form, often very compound, and descriptive of the colour or brilliancy of the dye, or the virtues of the drug, or else denote the country it comes from.* Many of them are equally applied to Safflower, or to Turmeric, though in the last case the feminine gender is employed instead of the neuter. Professor Monier Williams† says that, all words meaning 'night' appear to be used for *Curcuma*; instances are *niśā*, *śarvarī*, *rajanī*. Of course the Chinese names for Saffron have no connection with any others, but owing to the comparatively late introduction of the drug into China are of no very great interest. There remain two words which deserve notice:

1. Hindustani केसर, *kesar*, the bazar name for Saffron in the form in which it comes to market. This word has an interesting history,‡ which may be here summarized. Sanskrit केश, *keśa*, signifies the 'hair of the head.' Sanskrit केशर, *keśara*, or केसर, *kesara*, signifies occasionally (1), the 'hair of the head'; compare the Latin *cæsaries*; more often, (2) the 'mane of animals'; or, (3) the filaments of flowers. From this word in signification (2) come केसरी, *kesarī*, and केशरि, *keśari*, 'a lion,' the maned animal *par excellence*. From signification (3), with the addition of वर 'the best,' come Sanskrit केसरवा, *kesarawara*, 'the best filament,' *i.e.*, 'Saffron,' and Hindustani केसर, *kesar*, 'Saffron.'

The analogy of *kesar* gives some slight support to the old-fashioned derivation, mentioned in botanical books, of the Greek κρόκος, from the like-sounding word κρόκη, 'a thread,' but as there is no trace of the word κρόκη having been used for the filaments of flowers in Greek, the link which is present in the derivation of the word *kesar*, is wanting here. Modern philologists, for instance Curtius, simply ignore the antiquated explanation of κρόκος, as untenable in the face of the pretty clearly established importation of the word from a Semitic, probably a Phœnician source.

---

* E.g., *kaśmirajam*.

† *Sanskrit Lexicon*, p. 828.

‡ See the *St. Petersburg Sanskrit Lexicon*, vol. ii, pp. 431–436; and Platts' *Hindustani Dictionary*, p. 889.

2. Turkish چیگدم, *chīg-dem*, the flower Crocus; probably applied to various species, and not confined to the Saffron-producing *C. sativus*, for the glossaries know of yellow, purple, and blue *chīg-dem*. Probably the word is also applied to other flowers of more or less similar appearance. آجی چیگدم, *ajī chīg-dem*, 'bitter *chīg-dem*,' is a name for Colchicum.

Crocus in the Greek and Latin Classics.

In classical literature, both Greek and Latin, few flowers hold a more honourable place than the Crocus. This distinction it owes rather to the use made of Saffron than to any striking beauty of the flower itself. Yet it is hard to believe that the Greek poets at least were not struck by the glory of the golden-flowered crocuses which they must have seen.*

The earliest occurrence of the word κρόκος in extant literature is in Homer, *Iliad* xiv, 347:—

τοῖσι δ' ὑπὸ χθὼν δῖα φύεν νεοθηλέα ποίην,
λωτόν θ' ἑρσήεντα ἰδὲ κρόκον ἠδ' ὑάκινθον.

Here, as in the following passages in which a flower is spoken of, it is impossible to say whether the Crocus of the poet's imagination is a cultivated Saffron Crocus, or some wild species, possibly idealized, as Hehn suggests, in allusion to the royal Saffron dye. At any rate, with the exception of the golden-flowered wild kinds, they do not differ so much as the dog and briar roses of our hedges differ from the garden rose.

In the Homeric hymn to Ceres, Proserpine is gathering Crocus flowers, line 6:—

ἀνθεά τ' αἰνυμένην, ῥόδα καὶ κρόκον ἠδ' ἰὰ καλά
again 428, νάρκισσόν θ', ὃν ἔφυσ', ὥσπερ κρόκον, εὐρεῖα χθών
and 425, μίγδα κρόκον τ' ἀγανὸν καὶ ἀγαλλίδας ἠδ' ὑάκινθον.

So too in the hymn to Pan, line 25:—

ἐν μαλακῷ λειμῶνι, τόθι κρόκος ἠδ' ὑάκινθος
εὐώδης θαλίθων καταμίσγεται ἄκριτα ποίη.

---

* *See* below. For classical notices of Crocus, see the long, rambling, gossiping note of Bodæus on Theophrastus, *Hist. Plant.*, vi, 6: Amsterdam, 1644. Folio. pp. 661, *et sqq.*; but above all, the delightful chapter on Saffron in Hehn's *Kulturpflanzen und Hausthiere*. Both the first edition, Berlin, 1870, in which alone the quotations are given in the original, and the fourth edition, Berlin, 1883, should be consulted. Unfortunately the author, misled probably by the grossly erroneous statement in Fraas' *Synopsis plantarum floræ classicæ*, p. 292, seems to assume that the Greeks can only have been familiar with two species of Crocus, the cultivated 'Oriental *Crocus sativus*,' and 'the modest European spring Crocus, *Crocus vernus*.' Now that we know that *C. vernus*, L., does not grow in Greece or Asia Minor, but that several brilliant golden flowered species, e.g., *Crocus aureus*, *Crocus chrysanthus*, *Crocus Olivieri*, occur there not uncommonly, it is impossible to follow him in any conclusions which rest upon that assumption.

But in the hymn to Ceres, line 177, golden hair is likened to the crocus flower :—

ἀμφὶ δὲ χαῖται
ὤμοις ἀΐσσοντο κροκηίῳ ἄνθει ὁμοῖαι

This, like the similar passages given below, admits of three interpretations :—

First, that the poet does not mean what he says, "like the flower," but "like the stigmata of the flower," for they are the only golden part of the Saffron Crocus. This is the explanation of such expressions adopted by Martin on Virgil, Georg. iv, 182 ; but surely any poet in any language, let alone Greek, can say "golden-eyed," when that is his meaning.

Secondly, that by the words "like the flower," we must understand, "like the dye made from the flower." This would indeed be not unlike Virgil's manner ; and for other reasons may be the right interpretation of the Latin passages, but it seems too elaborate for the line just quoted.

Thirdly, that the words do mean what they seem to mean. 'Golden hair' really is like the golden flower of the golden Crocuses, which grow wild on the hills of Attica, Bœotia, Peloponnesus, Thrace, near Sestos, near Smyrna, in Bithynia, in Phrygia, in the Troad, and some of which we now know so well in English gardens.*

Meleager, *Epig.* ii, 7, has *χρυσανθὴς κρόκος*, 'the golden flowered crocus,' and Sophocles O.C. 685, in the famous chorus which sings the beauties of Attica, after describing the green woody glades, the ivy, the many berried bushes, the narcissus, goes on to mention *ὅ τε χρυσαυγὴς κρόκος*, "the gold gleaming Crocus." This expression is usually explained as referring to the golden stigmata of a lilac or whitish Crocus, but surely the poet may have had a golden-flowered Crocus in his mind, for though now no golden Crocus grows actually at Colonus or in the surrounding plain,† *Crocus Olivieri*, Gay, is plentiful on the higher hills of Attica, and in days when the land was better wooded may have descended to a lower level. Professor Lewis Campbell compares Tennyson's *Œnone*, "And at their feet the Crocus brake like fire," where the English poet is doubtless thinking of the golden Crocuses so common in our gardens. We may add Euripides, *Ion*, 887 :—

ἦλθές μοι χρυσῷ χαίταν
μαρμαίρων, εὖτ' ἐς κόλπους
κρόκεα πέταλα φάρεσιν ἔδρεπον
ἀνθίζειν χρυσανταυγῆ.

and *Moschus*, i, 68 :—

αἳ δ' αὖτε ξανθοῖο κρόκου θυόεσσαν ἔθειραν
ἐρέπτον ἐριβαίνουσαι.

* I should have greater hesitation in suggesting what I believe to be a new explanation, were it not clear that none of the commentators have been aware that golden Crocuses are indigenous to the shores of the Ægean.

† *See* Heldreich's *Pflanzen der Attischen Ebene*, being the fifth part of *Griechische Jahreszeiten*, edited by Aug. Mommsen.

Callimachus, *Hymn to Apollo*, 81, speaks of the scented Crocus as a winter flower:—

ἄνθεα μὲν φορέουσιν ἐν εἴαρι, τόσσα περ ὧραι
ποικίλ' ἀγινεῦσι ζεφύρου πνείοντος ἐέρσην,
χείματι δὲ κρόκον ἡδύν.*

The Greek writers on natural history have something to say about the Crocus. Aristotle, *Mir. Ausc*, iii, speaks of the quantity which grew in Sicily, ἐν τῇ ἄκρᾳ τῆς Σικελίας τῇ καλουμένῃ Πελωριάδι τοσοῦτον γίνεσθαι κρόκον, ὥστε, etc., but an obvious hiatus in the text makes the sequel unintelligible. Theophrastus tells us that the root is fleshy (σαρκώδης, *Hist. Plant.* i, 8, 9, 10), that the plant is herbaceous (ποώδης, *Hist. Plant.* i, 10), that the leaves are like those of Tragopogon, only not so long (vii, 8) like those of Narcissus, only narrower (vii, 11). The Crocus has no stem but the flower stalk, and this flower stalk appears before the leaves; it has no conspicuous fruit, but the flower dies down with the flower stalk, and when it is withered† the leaves spring up (vii, 11). The text of Theophrastus is unfortunately exceedingly corrupt, and breaks down in the two following passages which distinguish more than one kind of Crocus. They are (vi, 8, 3) where the MS. reading is καὶ ὁ κρόκος ὅ, τε ὀρεινὸς εὔοσμος καὶ ὁ ἥμερος; and the author is conjectured to have written ὅ, τε ὀρεινὸς ἄοσμος καὶ ὁ ἥμερος; and (vii, 7, 4) where the MS. reading is καθάπερ οὐδὲ ὁ κρόκος, οὔτε ὁ εὔοσμος, οὔθ' ὁ λευκὸς, οὔθ' ὁ ἀκανθώδης, οὗτοι δὲ ἄνοσμοι. The word ἀκανθώδης, 'thorny' makes nonsense, since the passage cannot be understood of *Carthamus tinctorius*. Ἀνανθώδης has been conjectured, a word which does not occur elsewhere, and may mean either 'without bloom,' or 'blooming again'; and ἄοσμοι is read for ἄνοσμοι. These are rather shaky foundations for the statement made by Hehn.‡ "Theophrastus distinguishes accurately between the wild, ὀρεινὸς, not scented *Crocus vernus*, and the cultivated, ἥμερος, and scented Crocus (*Hist. Plant.*, vi, 8, 3). The former he also calls the white, and a third kind the thorny Crocus, both of which are scentless (vii, 7, 4)." Into the impossible determination of κρόκος ὀρεινὸς as *C. vernus*, Allione, he has probably been misled by Fraas.§ In fact, it is quite impossible to determine specifically any of the kinds

* These lines have given the Scholiast an opportunity for suggesting an etymology for κρόκος which he wishes to derive from κρῦος, παρὰ τὸ ἐν κρύει θάλλεσθαι! No less absurd is the derivation of κροκύδειλος from κρόκος and δεῖλος given by the old grammarians: "Terrestrem quidem crocodilum dictum volunt παρὰ τὸ φοβεῖσθαι τὸν κρόκον, unde et apiarii crocum alvearibus apponunt, quo conspecto fugit." *Stephani Thesaurus, sub voce.*

† αὐανθῇ, the reading ἀνανθῇ, 'reflorescit,' makes nonsense.

‡ Edition 1870, p. 177; edition 1883, p. 213.

§ *Synopsis plantarum florae classicae*, p. 292, where κρόκος εὔοσμος is identified with *Crocus sativus*, L., the Homeric Crocus and κρόκος ὁ λευκὸς of Theophrastus with *Crocus vernus*, Allione, β, *albiflorus*, which the author states to be common in Attica! and the κρόκος ἀκανθώδης καὶ ἄοσμος of Theophrastus with *Crocus minimus*, D.C.,

mentioned by Theophrastus, except the κρόκος εὔοσμος, which is doubtless *C. sativus*, L. When grown in England the scent of the flower is faint; the adjective may point to a greater development of scent in a sunnier climate, or the author's thought may have been 'scent-producing' rather than 'scented.'

There is another obscure passage (*Hist. Plant.*, vi, 6), speaking of a plant which delights to be trodden down, and grows best by waysides, but as κρόκος here is only a conjectural reading for καρπός, we may fairly doubt whether the plant meant really is a Crocus at all.

Both Dioscorides i, 7, 25, &c., and Galen ix, 4, &c., discuss the Saffron Crocus and its medical uses, but add nothing botanically.

Strabo, the geographer, who wrote whilst Augustus was emperor, tells us in his description of Cilicia (xiv, 5, § 5) that the best Saffron (κρόκος) grew there in the so-called Corycian 'cave' near the promontory and town of Corycus.* He describes this 'cave' as a circular hollow, sheltered by surrounding cliffs, much of it stony and full of bush, with Saffron-bearing grounds (ἐδάφη) scattered here and there. The excellence of Cilician, and especially Corycian Saffron is confirmed by many passages in Latin authors, *e.g.*, Pliny 21, 6 (17), and Sallust, *Hist.* ii, 23. Hehn even supposes it probable that Corycus took its name from the Crocus grown there. Of course this is a fanciful speculation, but it is not impossible. Nor is it impossible that the Crocus may have taken its name from Corycus, if that was one of the earliest districts in which Saffron was used. But it should be remembered that four other places were known to Greek geography by the name Κώρυκος, (1) in Lycia, (2) in Lydia, (3) in Pamphylia near Attaleia, (4) the north-west promontory of Crete.

This is not the place to discuss the use of Saffron by the ancients as a dye, a scent, and an unguent. Hehn points out that in early times the Saffron robe was a symbol of majesty, like the purple, which probably superseded it from its greater brilliancy.† The Irish kings wore the Saffron robe, and till late in the 16th century the lein-croch or Saffron shirt was worn by the Celts of the Hebrides.‡

The derivatives of κρόκος are of frequent occurrence in Greek literature; when

---

given as synonymous with *Crocus Imperati*, Ten., and stated to grow on Oeta and Korax! With the exception of κρόκος εὔοσμος = *C. sativus*, L., all these determinations are simply ridiculous. *C. vernus*, Allione, does not grow in Greece at all; *C. minimus*, D.C., peculiar to the islands of Corsica and Sardinia, is as far removed from *C. Imperati*, Ten., peculiar to the hills of South-western Italy, as two species of the genus Crocus can be.

* Κώρυκος, now Korghoz.

† Hehn cites *Aesch. Pers.*, 657; *Ag.*, 239; *Pind. Pyth.*, 4, 232; *Nem.* 1, 37; *Eur. Hec.*, 466; *Phœn.*, 1491; *Ar. Thesm.*, 1044.

‡ Martin's *Journey to the Western Islands.*

not applied to garments actually dyed with Saffron, they seem to convey the notion of a brilliant glowing colour, like that of flame or glowing embers, though occasionally their exact force is very obscure. Chaeremon, *ap. Athenæus*, 608, calls the Saffron dye 'sunlike.'—

κρόκον θ', ὃς ἡλιῶδες εἰς ὑφάσματα
πέπλων σκιᾶς εἴδωλον εἰσομόργνυται.

κροκόπεπλος, 'Saffron veiled,' is a Homeric epithet of the dawn* used also by Hesiod. Theocritus calls the golden-berried ivy κροκόεις,† and Galen uses the phrase κρόκος ὠοῦ of the yolk of an egg. In *Aesch. Ag.*, 1090:—

ἐπὶ δὲ καρδίαν ἔδραμε κροκοβαφὴς σταγών.

the word κροκοβαφὴς as applied to a blood-drop is exceedingly obscure; it has been explained, "the blood-drop leaving a pale hue," but how a colour which is χρυσαυγὴς and ἡλιώδης can be likened to that of a face pale from loss of blood, is not clear. Others translate "the ruddy life-blood."

The Latin *Crocus* or *Crocum*, like the Greek κρόκος, is used both as the name of a flower, and of the Saffron produced from it; no doubt the writers who use Crocus as a flower-name, with the exception, perhaps, of Pliny, would have applied it to many other species of Crocus besides *C. sativus*, perhaps to Colchicum, and even to other less similar bulbous plants. The epithets of the flower Crocus in the poets are usually either too general, or of too doubtful meaning to give the botanist any help. The following are some of the principal passages in which *Crocus* means a flower:—

Virgil, *Georg.* iv, 182, *crocumque rubentem* mentioned as a favourite food of bees. Columella (*de Re Rustica*, ix, 4) directs it to be planted near the hive to colour and scent the honey. The idea conveyed by the epithet is probably that of 'glow,' 'blaze,' rather than of any definite colour; Lucretius (iv, 405) uses the adjective *ruber*, red, of a ray of the sun, Ovid (*M.* xi, 368), of a flame; but both *rubens* and *ruber* are also used of the 'purple' dye obtained from shell-fish, the exact colour of which is not now certainly known (Lucretius, ii, 35; Virgil, *Ecl.* iv, 43), or of blood (Horace, *Ode*, 3, 13, 7). In the present passage *rubens* is commonly explained as referring to the fiery colour of the stigmata. I venture to suggest that Virgil, though speaking of the flower, had present to his mind's eye the colour of the Saffron dye, with which he was doubtless much more familiar; this would be quite in Virgil's manner. Is it even possible that a golden-flowered Crocus may have been grown in Italy as an ornamental plant in Virgil's day?

* *Iliad*, viii, 1; xix, 1. † *Id.*, i, 31.

In the Culex (attributed to Virgil) 399, in a description of a garden, are the lines :—

hic est et Spartica myrtus
Atque hyacinthus, et hic Cilici crocus editus arvo.

Of course the *Cilici editus arvo* is merely an allusion to the celebrity of Cilician Saffron, and cannot be taken as evidence that the Crocus had been introduced from Cilicia.

Ipsa crocos tenues, liliaque alba legit. Ovid, *Fasti*, iv, 443.
Lilia deciderant, violas arere videres
Filaque punicci languida facta croci. *Id. id.*, v, 317.

In the first of these passages the Crocus is called 'slender'; in the second 'purple,' that is to say, the colour of the shell-fish dye. This epithet cannot, like the *rubens* of Virgil, be explained of the stigmata or of the Saffron dye, so we must suppose either that Ovid used the word quite at random for the sake of its prettiness, or that he meant the colour of the flower itself. This explanation is adopted by Liddell and Scott in their Greek Lexicon (*sub voce*, κροκοβαφής), not only for *puniceus* here, but for *rubens* in Virgil, *G.* iv, 182.

More commonly *Crocus* signifies Saffron used for various purposes as a colouring matter or a scent, often in the form of a liquid essence. Owing to the special celebrity of the Cilician growth, Saffron is sometimes called *spica Cilissa*, the word *spica* probably referring to some form in which it came into the market, for it is hardly applicable to the plant itself, or any part of it.

Et cum scena croco Cilici perfusa recens est. Lucretius, ii, 416.
Nonne vides, croccos ut Tmolus odores . . . . . mittit? Virgil, *Georg.*, i, 56.
Vobis picta croco et fulgenti murice vestis. Virgil, *Aen.*, ix, 614.
Crocum floresque perambulet Attæ Fabula. Horace, *Ep.*, ii, 1, 79.
Pulpita sollemnes non oluere crocos. Prospertius, IV, v, 1, 16.
Terque lavet nostras spica Cilissa comas. *Id.*, IV, v, 6, 76.
Nec fuerunt liquido pulpita rubra croco. Ovid, *A. A.* i, 104.
Nec fuerant rubri cognita fila croci. Ovid, *Fasti*, i, 341.
Et sonet accensis spica Cilissa focis. Ovid, *Fasti*, i, 76.
Effuso permaduisse Croco. Martial, v, 25.

In Ovid we find some brief allusions to the metamorphosis of the youth Crocos into the flower Crocus :—

Quid Crocon aut Attin referam. *Fasti*, v, 227.
Et Crocon in parvos versum cum Smilace flores. *M.*, iv, 283.

Smilax was the maiden whom Crocos loves. This legend personifying the Crocus was unknown to older Greek poetry, although mentioned by Galen, ix, 4, and was very possibly invented by Ovid himself.

That one or more kinds of Crocus were grown in Italy as garden flowers appears from Varro de R. R. 1, 35, 1 :—

Inter Vergiliarum occasum, et brumam, hæc fieri oportere dicunt. Serere lilium et crocum.

and from Columella de R. R. 3, 8, 4 :—

Florentesque hortos myrrha et croco.

Pliny 21, 6 (17) tells us that the Corycian Saffron was still the best: *Prima nobilitas Cilicio et ibi in Coryco monte, dein Lyciæ Olympo, mox Centuripino Siciliæ*, that its cultivation in Italy did not answer, *serere in Italia minime expedit*, that it was much adulterated, and various other details. It is noticeable that in a preceding chapter, 21, 5 (11) he uses the word *Crocus* to signify the yellow styles and stamens of other flowers.

HARRISON AND SONS, PRINTERS IN ORDINARY TO HER MAJESTY, ST. MARTIN'S LANE, LONDON.

INDEX AND SYNONYMY.

The prior specific names and leading subjects are printed in the larger type.

PAGE

Afghanistan, ... 34
Analysis of corm, . . . 2
— of Saffron, ... 71
Analysis of specific characters, Table of, 21
Annual reproduction of corm, Plate A, facing page 1, figs. 1—6, . . 3
Annulate corm tunics, Fig. 5, d, e, 6
Annulati, ... 22, 24, 281
Anthers, Plate B, fig. 1, facing page 16, 12
Attachment of Proper Leaves and Sheathing Leaves to Tunics, figs. 1, 2, 3, . 4
Baker, Mr. J. G., on the Classification of Crocuses 22
— — "*Review of The Known Species of Crocus*," . 22, 45, 46, 48
Basal Spathe, Plate A, fig. 7, . 9
Basal Tunic, Fig. 1, p. 4, fig. 5, b, d, e, g, p. 6, 5
Bauhin, Gaspard, "*Pinax*," . . 38
Bauhin, Jean, ... 38
Beard, ... 10
Bertoloni, Antonio, "*Descrizione dé Zafferani Italiani*," . . . 41
Boerhaave, Hermann, *Hortus Siccus* 36
Boissier, E., "*Diagnoses*," and "*Flora Orientalis*," 45
Bry, Theo. de, "*Florilegum Novum*," 38
Bouché, "*Gattung Crocus*," in Linnæa, 41
Bulbils, Plate A, facing page 2, figs. 1, 3, 3
Cap and Proper Leaf, Attachment of, fig. 2, 4
Capsule and Ovary, Plate B, facing page 16, fig. 5, a, b, c, d, e, . . 15
Capsule, dehiscence of, Plate B, facing page 16, figs. 3 and 4, . . 15
Carpels, ... 15
Carthamus, ... 57
Carruthers, Mr. W., on Pollen Grains, 13
Caruncle, ... 16
Castiglione, Ajcardo, "*Monografia dello Zafferano*," 42
Cells, Colour, ... 11
Chalaza, ... 16

PAGE

Chappellier, P., on a monstrous form of Crocus sativus, . . 19, 71
Classification and Sequence of Species, Chapter II. 20
Classification of Species, J. G. Baker on, 22
" " A. H. Haworth on, 10, 20
" " Dean Herbert on, 22
" " Joseph Sabine on, 20, 42
Clusius, ... 37
Collecting, packing and transmitting wild Crocus roots, ... 52
Colour cells of perianth, . . . 11
Corm, ... 1
— annual reproduction of, Plate A, facing page 2, figs. 1—3, . . 3
— bulbils, Plate A, facing page 2, figs. 1—3, 3
— chemical composition of, . 2
— descent of, fig. 11, page 18, . 18
— Seminal, Plate C, facing page 16, *l*, 3
— Stoloniferous, Plate VI, facing page 94, and Plate XII, facing page 112, . 3
— Tunics, fig. 4, page 5, and fig. 5, page 6, 3
— and Tunics, diagrammatic section of, fig. 1, page 4, . . 4
Cotyledon, Plate C, facing page 16, figs. 1 and 2, 17
Crispinus Passæus. "*Hortus Floridus*," 18
CROCIRIS iridiflora, Schur, = **Crocus iridiflorus,** Heuffel, . . 11, 76
"*Crocologia*," Hertodt's, . . 38
"*Crocorum Synopsis*," by the Hon. and Very Rev. W. Herbert, . . 43
Crocum montanum, Clusius, = **Crocus iridiflorus,** Heuffel, . . 76
"*Crocus*," Etymology of the word Crocus, C. C. Lacaita on, Appendix, . 1
CROCUS, Generic diagnosis, . . 73
Crocus Seeds, vegetation of, Plate C, facing page 16, . . 17, 50, 51

PAGE

Crocus, Species yet to be introduced, . 52
— Adami, Gay, = **C. biflorus,** var. **Adami,** Baker, . . . 12, 290
— **aerius,** Herbert, Plate LVIII, 12, 30, 285
— aërius, var. Pestalozzæ, Baker, = **C. biflorus,** sub-var. **Pestalozzæ,** . . 290
— aërius, vars. stauricus and pulchricolor, Herbert, = **C. aerius,** Herbert, 285
— **alatavicus,** Regel and Semenow, Plate XLV, . . . 25, 231
— **alatavicus,** var. **ochroleucus,** Baker, Plate XLV, fig. 3, . . 231
— albiflorus, Rchb. and Gay, = **C. vernus,** var. **albiflorus,** Baker, . 152
— albifrons, Kit., = **C. vernus,** var. **albiflorus,** Baker, . . . 142
— aleppicus, Baker, = **C. Gaillardotii,** 212
— algeriensis, Baker, = **C. nevadensis,** Amo and Campo, . . 222
— **ancyrensis,** Plate XXXVIII, 2, 205
— annulatus, var. Adamicus, Herbert, = **C. biflorus,** var. **Adami,** Baker, 290
— annulatus, var. argenteus, Herbert, = **C. biflorus,** Miller, . . 289
— annulatus, var. biflorus, Herbert, = **C. biflorus,** Miller, . . 289
— annulatus, var. chrysanthus, Herbert, = **C. chrysanthus,** Herbert, . 303
— annulatus, var. estriatus, Herbert, = **C. biflorus,** var. **estriatus,** Tchihatcheff, 290
— annulatus, var. lineatus, Herbert, = **C. biflorus,** Miller, . . 289
— annulatus, var. nubigena, Herbert, = **C. biflorus,** var. **nubigenus,** Baker, 290
— annulatus, vars. purpurascens and albus, Herbert, = **C. biflorus,** var. **Weldeni,** Baker, . . . 290
— appendiculatus, Kerner, = **C. montenegrinus,** Kerner, . . . 143
— argenteus, Sabine, = **C. biflorus,** Miller, 289
— **asturicus,** Herbert, Plate VIII, 12, 19, 29, 97
— atlanticus, Pomel, = **C. nevadensis,** Amo and Campo, . . 222
— Aucheri, Boiss., = **C. Suterianus,** Herbert, or **C. Olivieri,** Gay, ? . 259, 263
— **aureus,** Sibth. & Smith, Plate LV, fig. 10, no. 7, p. 14, . 5, 13, 15, 16, 31, 271
— **aureus,** var. **lacteus,** Plate LV^b, fig. 3, 271

PAGE

Crocus aureus, var. **lacteus penicillatus,** Plate LV^b, fig. 4, . . . 272
— aureus, var. **sulphureus,** Plate LV$_b$, fig. 5, . . . 271
— aureus, var. **sulphureus pallidus,** Plate LV^b, fig. 7, . . . 271
— aureus, var. **sulphureus striatus,** Plate LV^b, fig. 6, . . . 271
— aureus, Clarke in Clarke's Travels, ? = **C. gargaricus,** Herbert, . 209
— autumnalis, Brotero, = **C. Clusii,** Gay, 106
— autumnalis, var. multifidus, Brotero, = **C. Clusii,** Gay, . . 106
— autumnalis, Ker, = **C. serotinus,** Salisb., 99
— autumnalis, Cupani, = **C. longiflorus,** Rafin., . . . 162
— autumnalis, Lam., = **C. sativus,** L., 167
— **Balansæ,** Gay, Plate LI, . 255
— balcanensis, Janka, = **C. veluchensis,** Herbert, . . . 187
— banaticus, Gay, = **C. iridiflorus,** Heuffel, 76
— **banaticus,** Heuffel, Plate XXIV, 145
— **banaticus,** Heuffel, vars. *a.* **versicolor,** *b.* **concolor,** *c.* **pictus,** *d.* **niveus,** Schur., 145
— **biflorus,** Miller, Plate LIX, fig. i, fig. 10, No. 10, p. 14, 12, 29, 30, 31, 289
— biflorus, M. Bieb., = **C. biflorus,** var. **Adami,** Baker, . . 290
— biflorus, Vis., = **C. biflorus,** var. **Weldeni,** Baker, . . . 290
— **biflorus,** var. **Adami,** Baker, Plate LIX^b, fig. 2, e, f, g, . 291, 290
— **biflorus,** var. **estriatus,** Tchihatcheff, Plate LIX, fig. 2, . 291, 290
— **biflorus,** var. **nubigenus,** Baker, Plate LIX^b, fig. 3, h, i, j, . . 290
— **biflorus,** var. **Pestalozzæ,** Boiss., Plate LIX^b, fig. 4, k, l, m, n, o, . 291, 290
— biflorus, var. pusillus, Baker, = **C. biflorus,** Miller, . . . 289
— biflorus, var. violaceus, Boiss., = **C. biflorus,** var. **Adami,** Baker, . 290
— **biflorus,** var. **Weldeni,** Baker, Plate LIX^b, fig. i, a, b, . . 290, 291
— **Biliottii,** G. Maw, Plate LVI^b, 279
— **Boissieri,** G. Maw, Plate XX, 12, 53, 133
— Boryanus, Herbert, = **C. Boryi,** Gay, 241
— **Boryi,** Gay, Plate XLVII^b, 241
— Boryi, var. lævigatus, Baker, = **C. lævigatus,** Bory and Chaub., 247

PAGE

Crocus Boryi, Gay, var. **marathoniseus**, Plate LXVII[b], fig. 4, . . 241
— Boryi, var. Orphanidis, Baker, = **C. Tournefortii**, Gay, . . 238
— Boryi, var. Tournefortii, Baker, = **C. Tournefortii**, Gay, . . 238
— byzantinus argenteus, Parkinson, = **C. iridiflorus**, Heuffel, . . 76
— byzantinus, Ker, = **C. iridiflorus**, Heuffel, . . . 76
— Cambessedesianus, Herbert, = C. Cambessedesii, Gay, . . 113
— **Cambessedesii**, Gay, Plate XIII, 10, 30, 112
— Cambessedesii, Klatt, = **C. cyprius**, Boiss. and Kotschy, . . 283
— campestris, Pallas, = **C. sativus**, var. **Pallasii**, . . . 168
— **cancellatus**, Herbert, Plate XXXI, and fig. 5, a, b, page 6, . 12, 28, 181
— **cancellatus**, var. **cilicicus**, Plate XXXI[b], 30, 182
— cancellatus, var. *β.* damascenus, Boiss., = **C. cancellatus**, var. **cilicicus**, . 182
— cancellatus, var. Kotschyanus, Herbert, = **C. cancellatus**, var. **cilicicus**, . 182
— **cancellatus**, var. **Mazziaricus**, Herbert, Plate XXXI, fig. 1, a, c, . 182
— **cancellatus**, var. **persicus**, Chappellier, 182
— **candidus**, Clarke, Plate LIV, . 54, 267
— **candidus**, Boiss. diag., = **C. Fleischeri**, Gay, . . . 321
— **carpetanus**, Boiss. & Reut., Plate XLI, fig. 4, d, page 5, fig. 8, c, page 8, fig. 10, no. 8, page 14, 13, 15, 29, 31, 215
— carpetanus var., Boiss. & Reut., = **C. nevadensis**, Amo & Campo, . 222
— Cartwrightianus, Herbert, = **C. sativus**, var. **Cartwrightianus**, . 167, 170
— Cartwrightianus, var. leucadensis, Herbert, = **C. hadriaticus**, var. **chrysobelonicus**, Herbert, . . . 175
— cashmerianus, Royle, = **C. sativus**, L., 167
— **caspius**, Fischer & Meyer, Plate XLVI, fig. 10, no. 12, p. 14, . . 54, 235
— **chrysanthus**, Herbert, Plate LXII, fig. 1, a, . . 12, 15, 31, 303
— **chrysanthus**, var. **albidus**, Maw, Plate LXII, fig. 1, d, . . 303
— **chrysanthus**, var. **cærulescens**, Maw, Plate LXII, fig. 1, e, f, . . . 303

PAGE

Crocus chrysanthus, var. **fusco-lineatus**, Baker, Plate LXII, fig. 1, b, . . 303
— **chrysanthus**, var. **fusco-tinctus**, Baker, Plate LXII, fig. 1, c, . . 303
— cilicicus, Kotschy, = **C. cancellatus**, var. **cilicicus**, . . . 182
— circumscissus, Haworth, = **C. biflorus**, Miller, . . . 289
— Clusianus, Herbert, = **C. Clusii**, Gay, 106
— **Clusii**, Gay, Plate X, . 25, 29, 105
— colchiciflorus, Reuter, = **C. serotinus**, Salisb, (?) . . . 99
— constantinopolitanus, Hertodt, = **C. pulchellus**, Herbert, . . . 316
— **corsicus**, Maw, Plate XXI, . 16, 30, 137
— crestensis, Eugene, = **C. versicolor**, Gawl. or **C. Tommasinianus**, Herbert, 124, 149
— cretensis, Körnicke, = **C. veneris**, Tappeiner, . . . 243
— **Crewei**, J. D. Hooker, Plate LX, . . . 30, 54, 295
— croceus, K. Koch, = **C. chrysanthus**, Herbert, . . . 303
— **cyprius**, Boiss. & Kotschy, Plate LVII, . . 10, 12, 30, 54, 283
— **dalmaticus**, Visiani, Plate XXXIV, 193
— damascenus, Herbert, = **cancellatus**, var. **cilicicus**, . . . 2, 182
— **Danfordiæ**, G. Maw, Plate LXIII, fig. 5, c, d, e, page 6, . . 307
— dianthus, K. Koch, = **C. cancellatus**, Herbert, . . . 182
— discolor, Reuss, = **C. reticulatus**, Stev., 195
— edulis, Boiss. & Blanche, = **C. cancellatus**, var. **cilicicus**, . . 2, 182
— **etruscus**, Parlatore, Plate XXII, 141
— exiguus, Schur., = **C. banaticus**, Heuffel, 145
— fimbriatus, Lapeyr., = **C. nudiflorus**, Smith, . . . 92
— flavus, Haworth, = **C. aureus**, var. **sulphureus**, . . . 271
— **Fleischeri**, Gay, Plate LXVI, & fig. 4, f, page 5, . . 3, 22, 23, 31, 321
— Fleischerianus, Herbert, = **C. Fleischeri**, Gay, . . . 321
— floribundus, Haworth, = **C. aureus**, Sibth. & Smith, . . 271
— fragrans, Haworth, = **C. versicolor**, Gawl, 124
— fulvus, Pallas, = **C. susianus**, var. **fulvus**, 199
— **Gaillardotii**, Plate XL, 2, 53, 211

PAGE

Crocus gargaricus, Herbert, Plate XXXIX, . . 1, 10, 16, 168, 209
— græcus, Chappellier, = **C. sativus**, var. **Cartwrightianus**, . . 168
— **granatensis**, Boiss., . 29, 53, 95
— graveolens, Boiss., = **C. vitellinus**, Wahl., 253
— **hadriaticus**, Herbert, Plate XXX, 10, 30, 175
— **hadriaticus**, var. **chrysobelonicus**, Herbert, Plate XXX, fig. 3, . 175, 176
— **hadriaticus**, var. **Saundersianus**, Herbert, Plate XXX, fig. 1, . . 175
— Haussknechtii, Boiss., = **C. sativus**, var. **Haussknechtii**, . . 53, 168
— Herbertianus, Körnicke, = **C. iridiflorus**, Heuffel, . . . 76
— **hermoneus**, Kotschy, Plate XLIV, 54, 229
— Heuffellianus, Herbert, = **C. banaticus**, Gay, . . . 145
— Heuffellii, Körnicke, = **C. banaticus**, Gay, 145
— hybernus, Fridw., = **C. sativus**, var. **Pallasii**, . . . 768
— **hyemalis**, Boiss. & Blanche, Plate XLIII, 25, 225
— **hyemalis**, var. **Foxii**, G. Maw, Plate XLIII, figs. 8 & 9, . . . 13, 226
— hyemalis, var. Gaillardotii, Boiss., = **C. Gaillardotii**, . . . 211
— **Imperati**, Tenore, Plate XIV, 117
— **Imperati**, var. **albiflos**, Herbert, Plate XIV^{b}, fig. 6, . . 118, 119
— **Imperati**, var. **Reidii**, G. Maw, Plate XIV^{b}, fig. 4, . . 118, 119
— Imperatonius, Herbert, = **C. Imperati**, Tenore, . . . 119
— insularis, Gay, = **C. minimus**, De Cand., 130
— insularis, Herbert in Bot. Reg. XXIX, tab. 21, = **C. corsicus**, G. Maw, . 138
— insularis, var. 1, major, Herbert, = **C. corsicus**, G. Maw, . . 138
— intromissus, Herbert, = **C. Gaillardotii?**, 212
— ionicus, Herbert, = **C. Boryi**, Gay, 241
— **iridiflorus**, Heuffel, Plate I, fig. 7, page 8, & fig. 10, no. 2, p. 14, 11, 12, 52, 75
— italicus, Gaud, = **C. biflorus**, Miller, 290
— **Karduchorum**, Kotschy, Plate V, 9, 52, 89
— Korolkovii, Boiss., = **C. Korolkowi**, Regel & Maw, . . . 275
— **Korolkowi**, Regel & Maw, Plate LVI, 275
— lacteus and C. lacteus concolor, Sabine, = **C. aureus**, var. **lacteus**, . 272

PAGE

Crocus lævigatus, Bory & Chaub., Plate XLIX, & fig. 5, f, g, h, p. 6, & fig. 10, no. 4, p. 14, 247
— lagenæflorus, Haworth, = **C. aureus**, Sibth. & Smith, . . . 271
— lagenæflorus, vars. 1 & 2, Salisb., = **C. aureus**, var. **lacteus**, . . 272
— lagenæflorus, vars. 2 & 3, Haworth, = **C. aureus**, var. **lacteus**, . . 272
— lagenæflorus, var. 3, Salisb., = **C. aureus**, Sibth. & Smith, . . 271
— lagenæflorus, var. aureus lacteus Herbert, = **C. aureus**, var. **lacteus**, . 272
— lagenæflorus, var. candidus, Herbert, = **C. candidus**, Clarke, . . 267
— lagenæflorus, var. lacteus penicillatus, Sabine & Herbert, = **C. aureus**, var. **lacteus, penicillatus**, . . 272
— lagenæflorus, var. Olivierianus, Herbert, = **C. Olivieri**, Gay, . . 263
— lagenæflorus, var. stellaris, Herbert, = **C. stellaris**, Haworth, . . 203
— lagenæflorus, var. syriacus, Herbert, = **C. vitellinus**, Wahl. . . 253
— lagenæflorus, vars. striatellus, albidus, and isabellinus, Sabine, are old horticultural vars. of **C. aureus**, Sibth. & Smith, 272
— **lazicus**, Boiss. Plate XII, . 3, 53, 111
— **longiflorus**, Rafin., Plate XXVIII, 23, 29, 161
— longiflorus, var. melitensis, Delicata, = **C. longiflorus**, Rafin., . . 162
— longiflorus, Rchb., = **C. sativus**, var. **Pallasii**, . . . 168
— lineatus, Rchb., = **C. biflorus**, Miller, 289
— lusitanicus, Brotero, = **C. carpetanus**, Boiss. & Reuter,(?) . . 216
— luteus, Lamk. Encyc. vi, 385 = **C. aureus**, Sibth & Smith, . . 271
— magontanus, Rodrig., = **C. Cambessedesii**, Gay, . . . 114
— **Malyi**, Visiani, Plate XVIII, 10, 127
— marathoniseus, Heldr., = **C. Boryi**, var. **marathoniseus**, . . 241
— **medius**, Balbis, Plate XXVII, and fig. 10, no. 3, page 14, . . 9, 157
— melantherus, Boiss. & Orphan., = **C. Crewei**, J. D. Hooker, . . 295
— meridionalis, Hort & Osborne, = **C. versicolor**, Gawl. . . 124
— micranthus, Boiss., = **C. reticulatus**, var. **micranthus**, . . . 53, 196

PAGE

Crocus minimus, De Cand., Plate XIX, 10, 30, 129
— minimus, Cesati, = **C. vernus**, var. **siculus**, Tineo, ... 152
— minimus, Camb., = **C. Cambessedesii**, Gay, 114
— minimus, Bot. Mag. Tab. 2991, = **C. biflorus**, Miller, . . . 289
— minimus, var. a. italicus, Gay, = **C. Imperati**, Tenore, . . . 118
— minimus, var. β. corsicus, Gay, = **C. corsicus**, G. Maw, . . . 137
— minimus, var. major, Presl, = **C. Fleischeri**, Gay, ... 321
— mœsiacus, Ker, = **C. aureus**, Sibth. & Smith, ... 276
— mœsiacus, J. Gay in Balansa, Plant Orient. exsic., num. 33, = **C. chrysanthus**, Herbert, ... 303
— mœsiacus, var. β. Ker, = **C. aureus**, var. **lacteus**, ... 272
— mœsiacus, var. lacteus, Baker, = **C. aureus**, var. **lacteus**, . 272
— mœsiacus, var. stellaris, Baker, = **C. stellaris**, Haworth, ... 203
— montanus, Hoppe, = **C. vernus**, var, **albiflorus**, Baker, . . 152
— **montenegrinus**, Kerner, Plate XXII, and fig. 10, no. 5, page 14, 19, 35, 143
— multifidus, Noë, = **C. pulchellus**, Herbert, ... 316
— multifidus, Rchb., = **C. speciosus**, M. Bieb, ... 311
— multifidus, Ramond, = **C. nudiflorus**, Smith, 92
— multiflorus, Schur., = **C. vernus**, Allione 152
— nanus, De Cand., Syn. Gall., p. 168 = **C. minimus**, De Cand. in Lamk. and De Cand., Fl. France, iii, p. 24, . 130
— neapolitanus, Tenore, = **C. Imperati**, Tenore, ... 118
— **nevadensis**, Amo & Campo, Plate XLII, and fig. 8, b, page 8 and fig. 10, no. 6, p. 14, . 15, 16, 29, 31, 221
— nivalis, Klatt, = **C. hadriaticus**, Herbert?, 175
— nivalis, Spruner, = **C. veluchensis**, Herbert? 187
— nivalis, Bory & Chaub., = **C. Sieberi**, Gay, 189
— nubigena, Herbert, = **C. biflorus**, var. **nubigenus**, Baker, . . 290
— **nudiflorus**, Smith, Plate VI, and fig. 6. c, page 7, . . 3, 9, 29, 91
— nudiflorus, Kit. in Schulte's, Œstr. Fl., = **C. iridiflorus**, Heuffel, . . 76

PAGE

Crocus nudiflorus, Boiss., = **C. granatensis**, Boiss., 95
— nudiflorus, Sibth. and Smith, = **C. cancellatus**, Herbert,. . 182
— nudiflorus, var. asturicus, Baker, = **C. asturicus**, Herbert, . . 97
— **ochroleucus**, Boiss. and Blanche, Plate XI, ... 109
— odorus, Biv.—Bern., = **C. longiflorus**, Rafin., ... 162
— odorus, Hampe, = **C. sativus**, var. **Cartwrightianus**, . . 168
— odorus, Visiani, = **C. sativus**, var. **Pallasii**, (?) . . . 168
— odorus, var. longiflorus, Herbert, = **C. longiflorus**, Rafin., . . 162
— odorus, var. melitensis, Delicata, and Bot. Reg., = **C. longiflorus**, Rafin,. . 624
— officinalis, Martyn, = **C. sativus**, Linn., 167
— officinalis, sativus, Huds., = **C. sativus**, Linn., ... 167
— officinalis, sylvestris, Huds., Fl. Angl., = **C. vernus**, Allione, . . 152
— **Olivieri**, Gay, Plate LIII, fig. 10, no. 9, p 14, . . . 263
— Orphanidis, J.D.Hooker, = **C. Tournefortii**, Gay, ... 238
— Orsinii, Parlat., = **C. sativus**, var. **Orsinii**, 56, 167, 169
— Pallasianus, Herbert, = **C. sativus**, var. **Pallasii**, . . . 168
— Pallasii, M. Bieb., = **C. sativus**, var. **Pallasii**, . . . 168
— Pallasii, Griesb., = **C. veluchensis**, Herbert(?), . . . 187
— **parviflorus**, Baker, Plate LXVII, and fig. 10, no. 13, p. 14, 5, 11, 23, 31, 54, 325
— parviflorus, Rchb., = **C. vernus**, var. **albiflorus**, Baker, . . 152
— parvulus, Herbert, = **C. Tournefortii**, Gay, ... 238
— peloponnesiacus, Orphan., = **C. hadriaticus**, Herbert, . . 175, 176
— penicillatus, Steud., = **C. Fleischeri**, Gay, 321
— Pestalozzæ, Boiss., = **C. biflorus**, var. **Pestalozzæ**, Boiss., . . 290
— pholegandrus, Orphan., = **C. Tournefortii**, Gay, ... 238
— præcox, Haworth, = **C. biflorus**, Miller, 289
— **pulchellus**, Herbert, Plate LXV, 11, 12, 214
— pulchricolor, Tchihatcheff = C. aërius, Herbert, . . . 286

PAGE

Crocus "purpureus," Herb. Sloan., Brit. Museum, = **C. Clusii,** Gay, . . 106
— pusillus, Tenore, = **C. biflorus,** Miller, 289
— pylarum, Tchihatcheff, = **C. cancellatus,** var. **cilicicus,** . . 182
— pylarum cilicicarum, Gay, = **C. cancellatus,** var. **cilicicus,** . . 182
— pyrenæus, Herbert, = **C. nudiflorus,** Smith, . . . 92
— pyrenæus purpureus, Parkinson, = **C. nudiflorus,** Smith, . . 92
— Reinwardtii, Rchb., = **C. versicolor,** Gawl, . . . 124
— **reticulatus,** Stev., Plate XXXV, 12, 195
— reticulatus, var. "a," M. Bieb., = **C. susianus,** Ker, . . 199
— reticulatus, var. ancyrensis, Herbert, = **C. ancyrensis,** . . 205
— reticulatus, var. aureus, Trautv., = **C. susianus,** Ker, . . 199
— reticulatus, vars. auritextus, reflexus, and rectilimbus, Herbert, = **C. susianus,** Ker, 199
— reticulatus, var. dalmaticus, Herbert, = **C. dalmaticus,** Visiani, . 193
— reticulatus, var. 3, etruscus, Baker, = **C. etruscus,** Parlatore, . . 141
— reticulatus, sub var. immaculatus, Herbert, = **C. susianus,** var. **fulvus,** . 199
— **reticulatus,** var. **micranthus,** Plate XXXV[b], . . . 53, 196
— reticulatus, var. variegatus, Traut., = **C. reticulatus,** Stev., . . 196
— revolutus, Haworth, = **C. susianus,** Ker, 199
— Rœgnerianus, K. Koch, = **C. susianus,** Ker, ... 199
— **Salzmanni,** Gay, Plate IX, 2, 25, 29, 101
— Salzmannianus, Herbert, = **C. Salzmanni,** Gay, . . . 101
— **sativus,** Linn., Plate, XXIX, also fig. 6, b, page 7, and fig. 10, no. 1, page 14, 2, 10, . . 16, 19, 29, 56, 167
— **sativus,** and allied species, . 165
— **sativus,** Baker, = **C. sativus,** vars., **Haussknechtii,** and **Orsinii,** 167, 168, 170
— sativus, Tenore, = **C. sativus,** var. **Pallasii,** . . . 168
"*Crocus sativus sauvage,*" Tenore, = **C. sativus,** var. **Orsinii,** . . 56, 167, 169
Crocus sativus, Sibth. & Smith, = **C. sativus,** var. **Cartwrightianus,** . 167, 170

PAGE

Crocus sativus, var. **Cartwrightianus,** Plate XXIX[b], . . 167, 168
— **sativus,** var. **Elwesii,** Plate XXIX[c], 168, 171
— **sativus,** var. **Haussknechtii,** 168, 170
— **sativus,** var. **Orsinii,** Plate XXIX, 167, 169
— **sativus,** var. **Pallasii,** Plate XXIX[a], and fig. 4, b, page 5, . 168, 171
— sativus, var. vernus, Linn. Sp. Plant., = **C. vernus,** Allione, . . 152
— **Scharojani,** Ruprecht, Plate III, 8, 9, 37, 83
— Schimperi, Gay, = **C. cancellatus,** Herbert, . . . 182
— serbicus, Kerner, exsic. Vienna Herb., = **C. Tommasinianus,** Herbert, . 149
— **serotinus,** Salisb., Plate VIII, and fig. 4, c, page 5,. . 29, 53, 95, 99
— serotinus of many herbaria, = **C. Clusii,** Gay, ... 106
— serotinus, Bert., = **C. longiflorus,** Rafin., 162
— serotinus, var. Salzmanni, Baker, = **C. Salzmanni,** Gay, . . 102
— Sibthorpianus, Herbert, = **C. Sieberi,** Gay, . . . 189
— Sibthorpianus, var. stauricus, Herbert, = C. aërius, Herbert, . . . 289
— siculus, Tineo, = **C. vernus,** var. **siculus,** Baker, ... 30, 152
— **Sieberi,** Gay, Plate XXXIII, fig. 1, and fig. 4, a, page 5, . . . 30, 189
— **Sieberi,** var. **versicolor,** Boiss. & Heldr., Plate XXXIII, figs. 3-8, . 189
— Sieberi, var. atticus, Boiss. & Orphan., = **C. Sieberi,** Gay, . . 189
— Sieberi, var. veluchensis, Baker, = **C. veluchensis,** Herbert, . . 187
— Sieberianus, Herbert, = **C. Sieberi,** Gay, 189
— smyrnensis, Poech, = **C. Fleischeri,** Gay, 321
— **speciosus,** M. Bieb., Plate LXIV, 3, 11, 311
— speciosus, Rochel, = **C. iridiflorus,** Heuffel, 76
— speciosus, Griseb., = **C. pulchellus,** Herbert, . . . 316
— speciosus, Wilson, = **C. nudiflorus,** Smith, 92
— Spruneri, Boiss. & Heldr., = **C. cancellatus,** Herbert, . . 182
— **stellaris,** Haworth, Plate XXXVII, . . . 31, 53, 203
— **suaveolens,** Bertoloni, Plate XV, 121
— sublimis, Herbert, = **C. Sieberi,** Gay, 189
— sulphureus, Klatt, = **C. Olivieri,** Gay, 263
— sulphureus, Griseb., = **C. chrysanthus,** Herbert, . . . 303

PAGE

Crocus sulphureus, var. "a," Ker, = **C. vitellinus,** Wahl., . . . 253
— **susianus,** Ker, Plate XXXVI, 12, 31, 199
— **susianus,** var. **fulvus,** . . 199
— susianus, var. ancyrensis, Baker, = **C. ancyrensis,** . . . 205
— susianus, var. immaculatus, Baker, = **C. ancyrensis,** or **C. susianus,** var. **fulvus,** . . . 199, 205
— susianus, Klatt, = in part **C. stellaris,** Haworth, ... 203
— **Suterianus,** Herbert, Plate LII, . 259
— Suwarrowianus, K. Koch, = **C. Vallicola** var. **Suwarrowianus,** Plate II. fig. 3, 80
— sylvestris autumnalis, Castelli, = **C. longiflorus,** Rafin., . . 162
— sylvestris, vernalis, Castelli, = **C. biflorus,** Miller, . . . 290
— syriacus, Boiss. and Gaill., = **C. vitellinus,** Wahl, . . . 253
— **tauri,** G. Maw, Plate LXI, 54 299
— thessalus, Janka, = **C. veluchensis,** Herbert, . . . 187
— thessalus, Boiss., = **C. Sieberi,** Gay, 189
— Thirkeanus, K. Koch, = **C. gargaricus,** Herbert, . . . 209
— Thomasii, Tenore, = **C. sativus,** var. **Pallasii,** . . 168, 171
— Thomassianus, Herbert, = **C. sativus,** var. **Pallasii,** . . 168
— tingitanus, Herbert, = **C. Salzmanni,** Gay, . . . 101
— **Tommasinianus,** Herbert, Plate XXV, 149
— Tournefortianus, Herbert, = **C. Tournefortii,** Gay, . . . 237
— **Tournefortii,** Gay, Plate XLVII, 12, 237
— uniflorus, Schur., = **C. banaticus,** Heuffel, . . . 145
— **vallicola,** Herbert, Plate II, figs. 1 and 2, and fig. 8, a, page 8, 11, 31, 79
— **vallicola** var. **lilacinus,** G. Maw, Plate II, figs. 10 and 11, . . 80
— **vallicola** var. **Suwarrowianus,** Plate II, fig. 3, . . . 80
— variegatus, Hoppe and Hornsch, = **C. reticulatus,** Stev. . . 196
— variegatus, var. micranthus, Boiss., = **C. reticulatus,** var. **micranthus,** . 196
— **veluchensis,** Herbert, Plate XXXII, . . . 53, 187

PAGE

Crocus veluchensis, Schott, Schur., Baker, = **C. banaticus,** Heuffel, . . 145
— **veneris,** Tappeiner, Plate XLVIII, 30, 54, 243
— **vernus,** Allione, Plates XXVI & XXVI^{b}, & fig. 6, a, page 7, & fig. 10, no. 11, page 14, 2, 12, 15, 28, 29, 30, 151
— **vernus,** var. **albiflorus,** Baker, Plate XXVI^{b}, fig. 9, . . 30, 152
— **vernus,** var. **leucorhyncus,** Plate XXVI^{b}, fig. 4, . . 152
— **vernus,** var: **siculus,** Plate XXVI$_{b}$, fig. 9, . . . 30, 152
— vernus, Brotero, = **C. carpetanus,** Boiss. and Reuter, . . 216
— vernus, Brug., = **C. banaticus,** Heuffel, 145
— vernus, Curtis, = **C. aureus,** Sibth. and Smith, . . . 271
— vernus, Linn., = **C. aureus,** Sibth. and Smith, . . . 271
— vernus, Desf., Fl. Atlant., = **C. nevadensis,** Amo and Campo, . . 222
— vernus, Moretti, = **C. biflorus,** Miller, 289
— vernus, M. Bieb., = **C. biflorus,** var. **Adami,** Baker, . . 290
— vernus, Rob. Cat. Toul., = **C. versicolor,** Gawl, . . . 124
— vernus, Smith, Prod., = **C. Sieberi,** Gay, 189
— vernus, Ucria, = **C. longiflorus,** Rafin., 162
— vernus, angustifolius parvo flore, Cup., = **C. biflorus,** Miller, . . 290
— vernus, flavus striatus, Park. Parad., = **C. aureus,** var. **sulphureus striatus,** 271
— vernus, latifolius flavo flore minore et pallidiore, Bauhin, = **C. aureus,** var. **sulphureus pallidus,** . . 271
— vernus, striatus vulgaris, Park., = **C. biflorus,** Miller, . . 289
— vernus, minore albicans, Seg., = **C. biflorus,** Miller, . . 290
— vernus, var. a, Seb. & Maur., = **C. suaveolens,** Bertoloni, . . 121
— vernus, var. v, Seb. & Maur., = **C. biflorus,** Miller, . . 290
— vernus, var. 4, Tommasinianus, Baker, = **C. Tommasinianus,** Herbert, . 149
— **versicolor,** Gawl., Plate XVI, and fig. 4, e, page 5, . . 2, 11, 12, 123
— versicolor, Barcelo, = **C. Cambessedesii,** Gay, ... 114

PAGE

Crocus versicolor, Munby, Cat. plant. Alger., = **C. nevadensis,** Amo & Campo, . 221
— Visianicus, Herbert, = **C. longiflorus,** Rafin. or **C. sativus** var. **Pallasii ?** 162, 168
— **vitellinus,** Wahl., Plate L, 15, 16, 28, 253
— vitellinus, var. Balansæ, Baker, = **C. Balansæ,** Gay, . . 255
— vittatus, Schlosser, = **C. banaticus,** Heuffel, . . . 145
— Weldeni, Gay, = **C. biflorus,** var. **Weldeni,** Baker, . . . 290
— Welhelmii, Fisch. & Meyer, = **C. longiflorus,** Rafin., . . 162
— Zohrabii, G. Maw in Gard. Chron. = **C. vallicola,** var. **Suwarrowianus,** 80
— **zonatus,** Gay, Plate IV, 1, 10, 11, 28, 31, 89, 85
"Crokers," 65
Cultivation of Crocuses, Chapter V, . 50
Cyanic species of Crocus, . . 12, 22
"Dapes inemptæ of de Moufe-Schans," Petrus Hond, . . . 39
De Bry, I. Theo., *"Florilegium Novum"* and *"Florilegium Renovatum,"* . 38
Dehiscence of the Capsule, Plate B, facing page 16, figs. 3—4 and fig. 5, e, . 15
Depilati, ... 10, 20, 41
Descent of the Corm, fig. 11, . 18
Dissepiments of the Ovary and Capsule, Plate B. facing page 16, fig. 5, . 15
Dissepiments in the Pollen tubes, fig. 9, 13
Distribution, Geographical, Chapter III, 25
Districts, Geographical, . . 35
Duchartre, M.P., on a moustrous form of *Crocus sativus,* . . . 19, 72
Duncan Professor P.M., on Pollen Tubes, 13
Endosperm, . . . 17
English Saffron, ... 62
Ephemeral Root, Plate A, facing page 2, 3
Feathered markings of Segments, . . 11
Fibro-membranacei, . . 23, 24, 74
Filament, Plate B. facing page 16, fig. 1, 12
Foliar organs, . . . 7
Gawler J. B., (J. B. Ker,) *"Iridearum Genera,"* 42
Gay, J., Drawings of Crocuses, . 41
Gay, J., *"Novelles espéces de Crocus,"* 42, 43
Generic Diagnosis, . . . 73
Geographical association, special characters related to, . . . 31
Geographical distribution, Chapter III, page 25, . . 32, 33, 34

PAGE

Geographical distribution, Map and Tables of range in Latitude and Longitude, between pages 24, 25
— distribution in relation to natural affinity, . . . 29
— distribution, relation of specific groups to, . . . 31
— districts, . . . 31
Gerard's *"Catalogus Arborum"* and *"Herball,"* 37
Germination of seed, Plate C. facing page 17, . . . 16 17
Gilbert, Samuel, *"Florist's Vade Mecum,"* 38
Goldbach, K. L., *"Monographiæ Generis Croci,"* 41
Golden banded variety of Crocus Vernus, Plate D, facing page 19, fig. 6, 16
Groves, H., on Saffron cultivation in The Abruzzi, . . 61
Haworth, A. H., on The Classification of Crocuses, . . . 10
— on The Cultivation of Crocuses, 41
"Hay Saffron," . . . 68
Herbarium Sloaneanum, . . . 36
Herbert, The Hon. and Very Rev. W., on The Classification of Crocuses, 22
— *"Crocorum Synopsis,"* . . 43
— Drawings of Crocuses in the Lindley Library, . . . 44
— *"A History of the Species of Crocus,"* 44, 46
Hertodt's *"Crocologia,"* . . 38, 68
History and Literature, Chapter IV, . 36
Holinshed, Raphael, on Saffron Culture in England, . . 61, 63
Holostigma, ... 22
Holsteyn family, Drawings of Crocuses by, 40
Hond, Petrus, *"Dapes inemptæ of de Moufe-Schans,"* . . 39
Hooker, Sir J. D., Descriptions of Croci in the Botanical Magazine, . . 48
"Hortus Floridus" by Crispinus Passæus, 38
Hŭrsinein, ... 2
Intertexti, . . . 23, 24 319,
Involucrati, Plate A, facing page 2, fig. 7, 9, 22, 23, 74, 135
"Iridearum Genera," by J. B. Ker, (J. B. Gawler), . . 42
Karkom, ... 57
Ker, J. B., (J. B. Gawler), *"Iridearum Genera,"* 42
Klatt, Dr. J. W., *"Revisio Iridearum,"* . 46
Koch, K., on the Classification of Crocuses, 46
Krelage, J. H. of Haarlem, on Dutch literature relating to Crocuses, . . 38

PAGE

Latitude and Longitude, relative range of species in, fig. 12, . . . 26
Latitude, Range of Species in, Diagram page 24—25, . . . 24
Leaf Sections, fig. 6, page 7 and figs. 7 and 8 page 8, ... 7, 8
Leaf and Tunic structure, analogous, . 4
Leaves, Proper, fig, 2, page 4, . . 7
— , Sheathing, fig. 3, page 4, . 7
Life-History and Physiology, Chapter I, . 1
Linnæus, "*Hortus Cliffortianus,*" and "*Species Plantarum,*" . . . 40
Literature and History, Chapter IV, . 36
Longitude, Range of Species in, Diagram, page 24—25, . . . 24
Main Tunic and Sheathing-Leaf, attachment of, fig. 3, ... 4
Map of the Geographical distribution of the Genus, following page . 24
Maw, G., Publications on Croci, . 48, 49
— , on The Classification of Crocuses, . 23
Membranacei, . . . 22
Miller, "*Gardener's Dictionary,*" . . 40
Mohl, on Pollen Grains, . . 13
"*Monografia dello Zafferano,*" by Ajcardo Castiglioni, . . . 42
Monstrous forms of Croci, Plate D, facing page 19
Moretti, Guiseppi, "*Nonnulla de Crocis Italicis,*" 43
Morphosis, Plate D, facing page 19, . 19
Munting, Abraham, "*Waare Oeffening der Planten,*" . . . 39
Newton, James, . . . 37
"*Nonnulla de Crocis Italicis,*" by Guisseppi Moretti, . . . 43
Nudiflori, Plate A, facing page 2, fig. 7, 9, 22, 23, 179
Odontostigma, . . . 22
Ovary and Capsule, Plate B, facing page 16, fig. 5, a, b, c, d, e, . . 15
Owen, Miss M. C., on Monstrous forms of Crocuses, Plate D, fig. 6, facing page 19. 19
Parallelo-fibrosi, . . . 22
Parkinson's "*Paradisus,*" . . 38
Parlatore, Filippo, Crocuses described in the "*Flora Italiana,*" . . 45
Passæus, Crispinus, "*Hortus Floridus,*" . 38
Pelletier, Gaspard, . . . 38
Perianth, ... 60
Piligeri, . . . 10, 20, 41

PAGE

"*Pinax,*" Gaspard Bauhin, . . 38
Plumule, ... 17
Pollen Grains, Plate B, facing page 16, fig. 2, 13
— Grains, Mr. W. Carruthers on, . 13
— tube, Professor P. M. Duncan on, fig. 9 page 63, . . . 13
— tube Cyclosis in, . . 13
Polychlorite, . . . 71
Proper leaf, attached to cap of tunic, fig. 1 and 2, page 4, . . 4
— leaves, . . . 7
— spathe, . . . 10
Raphe, ... 16
Reichenbach, H. G. L., "*Icones Critcæ*" and "*Icones Floræ Germanicæ,*" . 45
Reproduction and replacement of Corm, Plate A, facing page 2, figs. 1—6, 1, 2, 3
Reticulati, . . 22, 23, 24, 135
"*Revisio Iridearum,*" by Dr. J. W. Klatt, 46
Roots, ... 3
— , ephemeral, . . . 3
Sabine, Joseph, on Crocuses, in *The Transactions of the Horticultural Society of London,* 37, 42
Saffranine, . . . 71
Saffron, its history, cultivation and uses, Chapter IV, . . . 56
— adulteration, . . . 65, 68
— analyisis of, . . . 71
— reputed use in ancient Egypt, . 57
— in Asia Minor, . . . 60
— in Austria, . . . 61
— in China, . . . 9
— Classical references to, . 60, 70
— as a Dye, . . . 69
— in England, . . 62
— Etymology of the word *Saffron,* by C. C. Laciata, appendix, . 1
— in France, . . . 61
— "*Hay*" . . . 68
— in India, . . . 58
— in Italy, . . . 61, 62
— monstrous, Duchartre's and Chappellier's observations on . .
— as a perfume, . . . 69
— as a pigment, . . . 70
— in Persia, . . . 61
— preparation of, . . . 67
— in Spain, . . . 61
— therapeutic qualities, . . 68
— from wild species of Crocus, . 67

PAGE

Saffron Hill, ... 66
Saffron Walden, ... 64, 66
Scape, Plate A, facing page 2, fig. 7, 9
Schizostigma, ... 22
Sections of leaves, fig. 6, page 7, and figs. 7 and 8, page 8, . . 7, 8
Seed, germination of, Plate C. facing page 17, ... 16, 17
Segments, ... 11
Seminal Corm, Plate C. facing page 17, l, 17
Sequence and classification of species, Chapter II, . . 20
Shakespeare, references to Saffron by, 37, 66
Sheathing leaf, attachment of to main tunic, fig. 3, ... 4
Sheathing leaves, ... 7
Spathe, basal, ... 9
— proper, ... 10
Spathes, Plate A. facing page 2, fig. 7, 9
Special characters related to Geographical Association, ... 31
Specific characters, Tabular analysis of, 12
— groups, Geographical distribution of, 31
Spencer, references to Saffron by, 37, 61
Stigma, fig. 10, page 14, . . 14
Stigmata, J. G. Baker's system of classification on structure of, . . . 14
Stoloniferous corms, Plate VI, facing page 94, fig. 1, a, b, c, and Plate XII, facing page 112, ... 3

PAGE

Style, ... 15
Sub-nudi, ... 22
Sub-paralleli, ... 22
Sub-reticulati, ... 22
Sweert, Emanuel, "*Florilegium*," . 38
Tchihatcheff, Paul de. "*Asie Mineur*," . 46
Tenore, Michael, "*Mem. Crocchi. Napolitana*," and "*Flora Napolitana*," . . 41
Throat, ... 10
Tournefort, "*Institutiones*," . . 41
Tube, ... 10
Tunic, Basal, fig. 5, b, d, e, g, page 6, . 3
Tunic and leaf structure, analogous, . 4
Tunics of corm, fig. 4, p. 5, and fig. 5, page 6, 3
Tunics, Diagramatic section of, fig. 1, page 4, 4
Turner, William, on "*The Names of Herbes*," 37
Tusser, on Saffron, in "*Five Hundred Pointes of good Husbandrie*," . . 63
Uvedale's Herbarium . . 36
Van du Pas (Crispinus Passæus), "*Hortus Floridus*," 38
Vegetation of Crocus seeds, Plate C, facing page 17, . . 16, 17
"*Waare Oeffening der Planten*" by Abraham Munting, . . . 39
Weston, Richard, "*Universal Botanist*," 40
Wildenow, "*Species Plantarum*," . 40
Xanthic species of Crocus, . 12, 22

ERRATA.

Page 9, 8th. line from bottom, for Spathe read Spathes.
Page 36, 5th. line, for Sloneanum read Sloaneanum.
Page 38, bottom line, for Passæus read Passæus.
Page 54, 5th. line from bottom, for Assa read Arsa.
Page 63, 11th. line, for Lber read Liber.
Page 124, 9th. line, for Allioni read Allione.
Page 147, bottom line. for Kalossa read Kalocsa.
Page 152, 12th. line, for Van read Von.
Page 155, 9th. and 10th. line. for Harlaston read Harleston.
Plate VI, facing page 94, for Fig. 2, stigmata, read Fig. 3.
Plate LV*b*, facing page 274, Fig. 4, for pencillatus read penicillatus.
Plate LIX*b*, facing page 294, for circumcissus read circumscissus.
Plate LIX, for Fig. 2, March 10th, read Fig. 1*b*, March 10th.

B. FAWCETT, PRINTER, DRIFFIELD.

QL 59 .C7 M38
Maw, George/A monograph of the genus Cro
3 5185 00076 1021